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Implicit Theory of Intelligence and Achievement Goals among Hong Kong Secondary School Students

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Abstract

The present study examined the achievement orientation and motivational behavior of Chinese high school students in Hong Kong. Specifically, Grade 7 (N=187) and 9 (N=192) students responded to questionnaires adapted from Western studies, which measured their incremental theory of intelligence, goal orientations (learning, performance and work avoidance goals), and motivational behavior (monitoring strategy, superficial cognitive engagement, boredom, and choice of easy task). contradictory to previous belief, it was found in this study that students who believed intelligence as malleable placed greater emphasis on both learning and performance goals. In congruence with other studies, students who emphasized learning goals used more monitoring strategy, felt less boring in class, and had higher tendency to choose challenging task. Whereas, students who adopted the work avoidance goal reported more superficial cognitive engagement, felt more boring in class, and had higher tendency to choose easy task. The above pattern of relations among the various constructs was cross-validated using another independent sample of students.

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Chapter One Introduction

The Board of Education of Hong Kong, an institution comprised of teachers and school administrators, had recently conducted a survey on students' misbehavior in the classroom ("Student behavior survey", 1996). Six major students' misbehavior were identified among which failure to hand in assignments on time was the most serious one. Other classroom problems included forgetting to bring the textbooks, copying assignments from classmates and sleeping during the class. These problems also appeared in schools where students had higher academic achievement though to a lesser extent. The understanding of students' motivational orientation and behavior is always of great importance to teachers as well as educational researchers.

Purpose of the study

Recent motivational research has focused on the identification of the pattern relating individual personality, beliefs, classroom environment, achievement goals, cognitive based behavior and affective based behavior of the students in schools (Pintrich & Garcia, 1994). In this study, a model that link students' theories of intelligence, achievement goals and motivational behavior was examined. In brief, theories of intelligence refer to the belief of whether intelligence is inborn or malleable, achievement goals describe how people define what constitutes success, whereas motivational behavior being studied here include learning strategies, enjoyment and task choice. It is hypothesized that students with different beliefs of intelligence may adopt different achievement goals and will subsequently display different motivational behavior in the classroom. There seem to be some evidences suggesting that Chinese students emphasized effort and are learning oriented (e.g. Hau & Salili, 1990, 1991, 1996a, 1996b). It is interesting to see how various motivational constructs are related in such motivational orientation.

Some general questions that lead to the present study are : Why do some students enjoy learning while some do not ? Why do some students choose difficult task while others take easy one ? Why do some students take up some sophisticated and

more demanding studying method while others do not ? What are the determining factors for these cognitive and affective learning behavior of the students ? All these questions are of great interest to parents, teachers and educators.

More specifically, the purpose of the study is to find the relationships among theories of intelligence, achievement goals and other substantial motivational behavioral constructs that are influential on students' learning. The following questions have been asked : How does the belief of the malleability of intelligence influence students' adoption of different achievement goals ? How do achievement goals affect students' various motivational behavior ? What are the direct or indirect effects of students' theories of intelligence on their motivational behavior ?

Significance of the study

From time to time, teachers are looking for methods to reduce students' mal-adaptive learning behavior and to enhance their motivation and interest in study. This study examines important determinants of students' motivational behavior. By delineating and understanding the relationships among the constructs, teachers can adopt more effective motivational strategies to help students' learning. The present study contributed by examining the applicability of some western motivational theories in the Hong Kong Chinese classroom learning context.

In the study of achievement goals, three distinct yet related goals, have been identified, which are namely, learning, performance and work avoidance goals. Among the three goals, the work avoidance one has been comparatively less studied, particularly in the area between work avoidance goal and theory of intelligence. Students adopting this goal tend to achieve by just fulfilling the minimum task requirement. This goal is believed to be less desirable because it has been found to be associated with low intrinsic motivation and low persistence, which subsequently lead to worse academic achievements (Archer, 1994; Duda, & Nicholls, 1992; Meece, Blumenfeld, & Hoyle, 1988; Nicholls, Patashnick, & Nolen, 1985). In this study, the

relationship among work avoidance goal, theory of intelligence and learning strategies would be delineated.

Structural equation modeling would also be used to explore the relationship among the various constructs. As well as finding the partial correlations among various dependent and independent latent variables as in regression analyses, the structural equation approach has the additional advantages of taking into consideration the measurement errors of all the observed variables. Thus, it would give more accurate estimate of the relations among these constructs.

The thesis started with a review of the relevant literature in Chapters 2 and 3. In Chapter 2, the two main constructs of the study, namely, achievement goals and theory of intelligence, were introduced. The definitions, current interests and development related to these two constructs were examined. In the latter part of Chapter 2, following argument put forward by other researchers, it was suggested that students' theory of intelligence might affect their goal adoption. In Chapter 3, literature related to the effects of achievement goals on classroom motivational behaviour was reviewed. Specifically, how goals might affect learning strategies was discussed.

Based on the literature review, a theoretical framework of the study was proposed in chapter 4 and was summarized as the a priori model. In chapter 5, the operational definitions of the variables, the characteristics of the sample, the sources of measuring instrument and the procedure of the administration of the survey were provided. These were followed by hypotheses on the relations between the variables and the procedure of statistical analyses being used. The results and interpretation of the statistical analyses were presented in chapter 6.

In the last chapter, the validity of model and the importance of work avoidance goal were discussed. Possible generalization of the model and comparison of the present results with those from Western studies were also deliberated.

Chapter Two Implicit Theory of Intelligence and Achievement Goals

Achievement goals

Ames defined achievement goals as the purposes of the achievement behavior that were shaped by an integrated pattern of beliefs, attributions and attitudes (Ames, 1992; Blumenfeld, 1992; Nicholls, Cheung, Lauer, & Patashnick, 1989). When students become involved in the learning activities, whether they are voluntary or not, each one of them has their own aims or goals during the activities. These goals are believed to be the guidelines that direct their degrees of participation during the learning periods. Many researchers have proposed different achievement goals, such as, competitive, cooperative and individualistic goals (Ames, 1984a; 1984b; Ames & Ames, 1981; 1984; Ames & Felker, 1979; Ames, Ames & Felker, 1977), social goal (Urdan & Maehr, 1995), performance goal to gain approval and to advance in school (Hayamizu & Weiner, 1991). Two contrasting goals called learning goal and performance goal have received the most attention and investigation. Sometimes, they are also named as task involving and ego involving orientation (Nicholls, 1984), learning and performing goal (Dweck, 1986) or mastery focused and ability focused orientation (Ames, 1984b). Although the terminology are different, they bear the very similar meaning. In this study, the labels learning goal and performance goal will be used.

Learning goal and performance goal

Students emphasizing learning goal believe that effort and outcome covary (Weiner, 1979,1986). They expect that when they expend greater effort during the learning process, they will get better result. Their aims in class are to develop new skills, to learn more knowledge and to improve their level of competence . Although ability is believed to be important during the learning process, these students have the faith that when more effort is paid, the knowledge or skill will be mastered finally

(Ames & Archer, 1988; Nicholls, Patashnick, & Nolen, 1985). Their frame of comparison is self-referenced (Ames, 1992) in that they will feel satisfied when they get concrete improvement comparing with their previous achievement without comparing their accomplishment with others.

On the other hand, students emphasizing performance goal focus more on their ability and self-worth (Ames, 1992; Covington, 1984; Dweck, 1986; Nicholls, 1984b). They are more concerned with the evaluation of their abilities. Their aims are to obtain favorable evaluation by doing better than others and success with little effort. (Ames, 1984b; Covington & Beery, 1976). They will feel frustrated if they know that someone has paid less effort to complete the same job. Their frame of comparison is normative-based (Ames, 1992). Actual improvement in achievement may not make them feel happy if they find that other classmates have greater achievement.

Ames and Archer (1988) argued that achievement goals are affected both by the situational factors and individual factors. Social comparison is believed to be one of the situational factor. If the comparison of academic attainments between the students is induced by the teachers, performance goal is believed to become prevalently adopted by the students. Nevertheless, the effects of individual factors on the achievement goals are also important. Given the same classroom environment, different students may perceive the situation differently and so a different goal is adopted. For example, a student deeply interested in a subject will pay more effort and be more concerned with the process of learning itself rather than outperforming others. So, in this case a learning goal is adopted and the individual factor is pervading over the situational factor.

In a review article, Ames (1992) have summarized the motivational outcomes of the students who have taken up the learning goal. Those students usually show an emphasis on the self-regulated learning pattern. Because of their intrinsic interest in the subject, they spend more time on it (Butler, 1987; Meece, Blumenfeld, & Hoyle, 1988)

believing that when they pay more effort, the chance of success is increased (Ames & Archer, 1988; Nicholls, Patashnick, & Nolen, 1985). When a successful effort appears, it leads to pride and satisfaction (Jagacinski & Nicholls, 1984,1987). On the other hand, since inadequate effort will lead to guilty feeling (Ames, 1992), in order to avoid this, their persistence on their task is usually higher than others. Not only paying more effort in their study, their engagement in their study is active. More effective learning method and better problem solving strategies are used. And they show the preference of challenging task and risk taking (Ames & Arthur, 1988; Elliott & Dweck, 1988).

For students taking up the performance goal, their aim is to obtain favorable judgement on their ability and competence over others. So success is their main concern, whether or not they pay effort on it is less important. When they fail, they think that they do not have sufficient ability (Jagacinski & Nicholls, 1987) and so negative affect follows immediately (Covington, 1984; Dweck, 1986). On the other hand, success with little effort will provide positive affect (Jagacinski & Nicholls, 1987). Because these students care about the successful result only, the learning process is not their main concern. Their learning methods are usually superficial which are short term strategies (Meece et al., 1988; Nolen, 1988). Their self-concept of ability is weak, they tend to choose less challenging tasks (Dweck, 1986). As compared with the students taking up the learning goal, they enjoy challenging tasks without regarding to their self-concept of ability.

In sum, students emphasizing learning goal have positive attitudes toward their learning. Positive motivational behavior and effective learning strategies usually follow. Whereas, students emphasizing performance goal do not. Failure in particular usually lead to negative affective responses.

Work avoidance goal

In addition to learning and performance goals, a third goal called work avoidance goal has also been identified (Nicholls et al., 1985). It has also been referred to as the academic alienation goal by Archer (1994). Students who adopt this goal in their classrooms try to get the work done with minimum effort (Meece, Blumenfeld, & Hoyle, 1988). They are rather passive in their learning life as compared with those who adopt the learning goal. Students may have a negative attitude towards school works and would like to cope with teachers' requirements with minimum effort. The interests and main concerns of these students may be found outside the classroom or in other subjects, so they do not mind whether they could get good academic results for that subject.

The construct validities of the work avoidance goal have been demonstrated in exploratory factor analysis. In the goal orientation instruments which contained the work avoidance goal items, three factors (learning goal, performance goal and work avoidance goal) could be found (Archer, 1994; Duda & Nicholls, 1992; Nicholls et al., 1985). In Duda and Nicholls' (1992) study, the method of Oblimin rotation was used. Though the three factors were not totally independent to each others, the correlations among them were not strong.

The criteria-related validity of the work avoidance goal can be demonstrated by summarizing its correlation with other related motivational constructs. Work avoidance goal was found to be highly and negatively correlated with intrinsic motivation and attitude towards the subjects (Meece, Blumenfeld, & Hoyle, 1988). On the other hand, it was highly and positively correlated with boredom (Duda & Nicholls, 1992) and superficial cognitive engagement in the classroom (Meece et. al., 1988). Moreover, students who took the work avoidance goal as their orientation during learning tended to use ineffective learning strategies and avoid the challenge of difficult tasks (Archer, 1994).

Table 2.1
Correlations between work avoidance goal and learning goal / performance goal.

Studies	Learning goal	Performance goal
Archer (1994)	n.s. [a]	.22
Nicholls et al. (1985)	-.30 to -.45	.13 to .33
Meece et al. (1988)	-.50	.29
Duda & Fox (1992)	-.05	.18

a: non-significant.

The correlations of the work avoidance goal with learning goal and performance goal are listed in Table 2.1.

It is found that work avoidance goal is negatively correlated with the learning goal. The strength of the correlations varies from zero to strong negative. The correlations between the work avoidance goal and performance goal is moderately positive. In sum, work avoidance goal is a goal that is distinct from the learning goal and performance goal.

Work avoidance goal is believed to be closely related with the low academic achievement (Meece, Blumenfeld, & Hoyle, 1988; Nicholls, Patashnick, & Nolen, 1985). Hong Kong secondary schools are divided into 5 bands according to their achievement in senior primary school years. In the band 3, 4 or 5 secondary schools, in which the low achievers are dominating teachers often report that the lower form students show a lot of detrimental behavior such as copying assignments from their classmates, refusing to hand out their work, paying no attention during the lesson, and so on. If we have the opportunity to talk with these students, we will get an image that they are passive in their work, low confidence in learning, believing that their ability are below the standard and they lose the direction of learning in schools. This kind of learning characteristics are closely related to the consequences of the work avoidance goal orientations. In order to study their motivational behavior (such as persistence, cognitive engagement, attitude towards the subjects, intrinsic/extrinsic motivation),

only the learning goal and the performance goal are not enough, the work avoidance goal should be added into the framework as the third goal orientation.

Implicit theory of intelligence

Sternberg (Sternberg, Conway, Ketron & Bernstein, 1981; Sternberg & Powell, 1982) has distinguished two forms of theories of intelligence, namely the explicit and the implicit theories. The explicit theory refers to the structure built from actual field data (e.g. factor analysis of students performance in a set of intelligence test to show the structure of intelligence.). On the other hand, the implicit theory reflects people's subjective thinking of what intelligence is and is obtained through asking people to express their view on various aspects of intelligence (e.g. Dweck & Leggett, 1988). Some children think that their intelligence or ability is a fixed quantities, whichever they do, they cannot change this quantity very much. They are sometimes referred to as entity theorists. Dweck and Leggett (1988) have identified other children who believe that their intelligence or ability is a flexible quantity that when they read more books, do more exercises or try more puzzles, they can increase this quantity. These children are sometimes called the incremental theorists.

Dweck (1985, 1986, Dweck & Bempechat, 1983; Diener & Dweck, 1978, 1980; Dweck, Hong, & Chui, 1993; Dweck & Leggett, 1988; Dweck & Reppucci, 1973; Elliott & Dweck, 1988; Erdley & Dweck, 1993) developed the goal theory starting from the exploration of the helpless and mastery-oriented behavior. They proposed that the implicit theory of intelligence held by the children affect their choice of different achievement goals which in turn directs the children to helpless behavior or mastery-oriented behavior.

Helpless and mastery-oriented children

Diener and Dweck (1978, 1980) identified two different groups of children who behaved differently in an experiment when they faced the same difficulty. In their experiment, children were divided into two groups according to their Intellectual Achievement Responsibility Scale (IAR) score. The IAR contains items describing children's positive or negative common achievement experiences which they encounter daily. The children were asked to choose between two alternatives in the scale. One alternative attributed the cause of positive or negative experiences to someone else (external responsibility) while the other alternative attributed the cause to the children's own behavior (internal responsibility). Children were divided according to their scores at median split. The low score group were called the helpless children, and the high score group was called the mastery-oriented children. After this division, the children were asked to manipulate with a concept formation task. The task was well designed so that every child could solve the first eight problems but the following four problems were so difficult that none of them could solve them. During the process, the researcher recorded their problem solving strategies, self cognition, affect and behavior.

The results showed that helpless children quickly attributed their failure to low ability despite the fact that they had just solved eight problems successfully before. Boredom with the problems, feeling bitterness with the problems and becoming anxiety with their performance were recorded. Although they were capable of using the effective problem solving strategies in the first eight problems, they failed to use them again in facing the difficult problems. However, the mastery-oriented children showed a completely different set of behavior. When difficulties were faced, they were still optimistic and pay little concern about their failure. They instructed themselves to concentrate and pay more effort. Some children even showed that they were delighted by the challenging problems and the uses of the effective problem-solving strategies were maintained.

In sum, the mastery-oriented children shows positive self-cognition, positive affect and maintain the use of effective problem-solving strategies when they face the difficulties. However, for the helpless children, they shows negative self-cognition, negative affect and cannot maintain the use of effective problem-solving strategies.

Adoption of different achievement goals

In an attempt to explain the helpless and mastery-oriented behavior of the children, Elliott and Dweck (1988) proposed that the helpless children may take up the performance goal as their aim in the learning situations. So they are intended to show their ability to be capable in solving problems and try to avoid the difficult task that may give evidence of the inadequate ability. On the other hand, the mastery-oriented children may take up the learning goal as their aim in the learning situation such that they are trying to increase their competence or acquiring new skill in the challenging tasks. It is this different goal orientations that the children adopted lead to different motivation behavior. They hypothesized that when children hold the learning goal, disregard to their perceived ability, they will express mastery oriented behavior. However, for children taking the performance goal, their motivation behavior will be largely depended on their perceived ability. High perceived ability children express the mastery-oriented behavior as the learning goal oriented children do. But the low perceived ability children will express the helpless behavior (Table 2.2).

Elliott and Dweck (1988) verified their hypothesis by manipulating the achievement goals and the perceived ability of the fifth grade children. After a pattern recognition task, half of the children were told to have high skill while the other half was told to have low skill in the experimental tasks. In fact, the high/low skill groups were randomly assigned irrespective of their true performance. Then the same group of children was divided into two half again. The first half was oriented towards the learning goal by emphasizing the importance of acquiring new skills while the other half was oriented towards the performance goal by emphasizing the importance of

evaluating their ability. Both the learning goal or performance goal groups contained the high and low skill children.

The results of Elliott and Dweck (1988) indicated that when the children with performance goal and low perceived ability faced the difficulties, they attributed their failure to their lack of ability. Negative affect appeared and they did not intend to use effective problem-solving strategies to overcome the problems. In the case the children with performance goal and believing themselves as high skill, they expressed the same mastery-oriented behavior. Nevertheless, they intended to choose easier task instead of challenging task in order to avoid the chance of showing incompetence. In the case of children with learning goal, the belief of high or low skill was not important for them. They were willing to accept the challenging tasks even though the chance of failure was high, they wanted to learn new skill from them. During the problem solving process, they expressed positive affect and treated the tough work as the opportunity to sharpen their problem-solving strategies.

Although learning and performance goals are treated as two contrasting goals as discussed above, children may adopt quite different types of goals at different stages of their learning (Dweck & Leggett, 1988). Some children may be quite performance oreinted to start with and concentrate on their ability or competency. They are conscious of their own strengths and weaknesses. However, they may shift to be more learning oriented once they gain sufficent knowledge and self-confidence in their work.

For some other students, the sequence may be reversed. They may start with a learning orientation and are quite eager to acquire the knowledge and skill. When they attain a certain mastery level of the work, they may be more conscious in comparing their performance with peers or classmates. Thus, there is a shift to a more performance orientation. Generally only when students are overwhelmingly concern or

Table 2.2
Dweck theory of Achievement goals

theory of intelligence	Goal orientation	Perceived ability	Behavior pattern
Entity theory	Performance	high low	mastery oriented helpless
Incremental theory	Learning	high or low	mastery oriented

stress on performance rather than learning goals would such orientation becomes detrimental to their learning. The two goals are not necessarily two poles of one dimension, such that they are strongly and negatively correlated. Rather there are some empirical evidences suggesting that the two goals are positively correlated at a weak or moderate level (e.g., Meece et al., 1988; Miller, Behrens, & Greene, 1993; Nicholls et al. 1985).

In sum, Dweck et. al. found that the adoption of learning goal of the children leads them to the mastery-oriented behavior whereas the adoption of performance goal of the children with low perceived ability leads them to the helpless behavior.

The effects of implicit theory of intelligence on the achievement goals

Dweck and Leggett (1988) pointed out that children with the conception of flexible intelligence usually prefer the learning goal whereas children with the conception of fixed intelligence prefer the performance goal. In order to illustrate the causal relationship between the implicit theory of intelligence and the adoption of achievement goals, they quoted an unpublished experimental result from Dweck, Tenney and Dinces (cited in Dweck & Leggett, 1988). In that experiment, the children's theories of intelligence were manipulated by means of reading passages that described the intelligence of some famous persons as either a fixed or increasable quality. As a result, children who had read the passage of incremental theory were

more likely to adopt learning goals for the task designed for them. This result support the causal effect of implicit theories of intelligence on the choice of achievement goals.

In sum, Dweck et. al. found that the incremental theorist of intelligence usually take the learning goal and mastery-oriented behavior is followed. On the other hand, the entity theorist of intelligence usually take the performance goal and the helpless behavior is followed.

Implicit theory of intelligence in classroom environments

The theory of Dweck et al. had a few shortcomings. First of all, the results obtained by Dweck were come from experimental settings in which the children were under manipulation and the children were required to do some tasks which were not the usual classworks. For instance, in the study of Elliott and Dweck (1988), the perceived ability of the children was manipulated by random assignment. The feedback for the puzzle answers of the children was predetermined irrespect to that the answers were really true or not. It is hardly convincing that the elder child would accept this random and illogical evaluation. This situation will be even more serious when the experiment is carried out among the secondary school or university students.

Furthermore, the children in the experiment (Elliott & Dweck, 1988) were divided into two different groups of learning goal and performance goal. The goal orientation was treated as a bipolar quantity that the learning goal was at one end while the performance goal was at the other. However the learning goal and the performance goal were shown to be two different constructs which may be held by the students simultaneously (Dweck & Leggett, 1988). The artificial separation of the children into two groups might not be suitable if a complete picture was pursued.

The problems encountered by Dweck et al. were partly overcome by Roedel and Schraw (1995) and Hayamizu and Weiner (1991) by using the classroom

environments in their survey on university students. Roedel and Schraw (1995) tested the applicability of the goal theory of Dweck among 157 university students. They divided the theory into 3 parts. The first part dealed with the effect of the implicit theory of intelligence on the adoption of the achievement goals. The second part investigated the impact of the achievement goals on the behavioral responses when the students faced with the challenging task. The third part dealed with the direct effect of the implicit theory of intelligence on the behavioral responses. They found that the implicit theory hold by the undergraduate students was correlated with the learning goal of the students but not correlated with the performance goal. The first part of Dweck et al.'s theory was only partly confirmed. Their results also indicated that the implicit theory of the students was not related with their behavioral responses. That meant there was no direct effect from the implicit theory to the motivational behavior. The third part of Dweck et al.' theory was confirmed. However, they found nonsignifiant relation between the performance goal and the behavioral response.

In Hayamizu and Weiner (1991)'s study, it was surprising in finding that the implicit theory of intelligence was both correlated positively with the learning and performance goal that the strength of correlation between the learning goal and the implicit theory of intelligence was a bit larger. In their study, university students were asked to attribute their failure to different reasons: low ability, lack of effort, difficult task, professor's poor instruction and bad luck. Each reason was associated with three dimensions: internality, stability and controllability. The incremental theorists were defined as the ones that marked low score on the stability of low ability and marked high score on the controllability of low ability. On the other hand, the entity theorists were defined as the ones that marked high score on the stability of low ability and marked low score on the controllability of low ability.

Hayamizu and Weiner had suggested that the incremental theorists should be related with the learning goal whereas the entity theorists should be related with the performance goal as predicted by Dweck's theory. However, their results of the

multiple regression only confirmed part of Dweck's theory. Both the learning goal and the performance goal were related with the incremental theorists. The relation between the performance goal and the implicit theory was opposite from Dweck's proposed relation. Hayamizu and Weiner explained this differences by pointing out the different items wording in measuring the performance goal. In Dweck and Leggett (1988)'s study, performance goal was measured by items such as "I'd like problems that aren't too hard, so I don't get many wrong.". Challenge avoidance was stressed. However, in Hayamizu and Weiner (1991)'s study, the measure was similar to that of Nicholls et al. (1985), performance goal was measured as the extent of longing for gaining approval and outperforming others. Example was " I feel most successful in school when I do better than other students.".

In sum, the results of Roedel and Schraw (1995) and Hayamizu and Weiner (1991) only partly confirmed Dweck et al.'s theory. In Roedel and Schraw (1995)'s study, the implicit theory of intelligence was only related with the learning goal and did not relate with the performance goal. In Hayamizu and Weiner (1991)'s study, using different method of assessing the implicit theory and different emphasis on measuring the performance goal, the implicit theory was correlated with both the learning goal and performance goal.

Chapter Three Effects of Achievement Goals on Motivational Behavior

It is commonly believed that obtaining high academic standard is not the only result of the intelligence of the student. Using effective learning strategy in studying is also a very important factor. Skill and technique of effective learning strategy can be applied during a lesson or during a self-study such that the students' efficiency of acquiring new knowledge is increased.

Three types of learning approaches had been identified recently (Biggs, 1987; Entwhistle and Ramsden, 1983) and each approach consists of motive area and strategy area. The first one is called the deep-processing approach. Its motive is based on the intrinsic motivation to satisfy the curiosity of the student. Its strategies include extracting significant concepts among the whole set of information and trying to relate the newly learned concepts with the existing schemata. The second one is called the surface-level approach. Its motive is based on the extrinsic motivation to avoid failure and refuse working too hard. Its strategies include simply reading a whole passage over and over trying to remember all the new words. The third one is called the achieving approach. Its motive is based on a special type of extrinsic motivation to outperform others and to compete for high marks and high grades. Its strategies are usually systematic, the management of time and effort are optimized. Deep processing approach are believed to be more likely than the surface processing approach in understanding and retention of concepts in the brain.

Some researchers (Nolen, 1988; Nolen & Haladyna, 1990a, 1990b) further developed the idea of deep and surface processing strategies. The deep processing strategy is defined by three tactics. The first tactic is the discrimination of the important information from the unimportant information. The second tactic is trying to figure out how new information fits with previous knowledge that the students had learned. The result of learning is then improved through this tactic by constructing meaningful connection between the pieces of knowledge. It is also called the elaboration strategy.

The third tactic is to monitor the comprehension of the new knowledge. This tactic employed by the student is aimed at ensure the understanding of the learned material. It is also called the monitoring strategy. The surface processing strategies were also composed of 3 tactics. The first tactic is to read the whole passage over and over. The second tactic is to memorize all the new words. The last tactic is to repeat the information again and again.

Achievement goals and learning strategies

It is important to identify which factors are responsible in determining which learning strategies students employed during their study. Some researchers suggested that the valuing of strategy by the students was the influential factor (Pintrich, 1987). Some suggested that the affective components of motivation such as task value and interest are important (Thomas & Rohwer, 1986). Biggs (1991) pointed out that the practices of the teachers have direct effect on the adoption of surface processing strategies of the students. These practices include the advocation of extrinsic motivation such as rewards and punishments by the teachers and the setting of requirement for low-level rote responses or rote recall. On the other hand, the intrinsic motivation of the students such as the curiosity has direct impact on the adoption of deep processing strategies.

Effective learning strategies

One line of research related the use of the learning strategies with the students' achievement goals orientation. Ames and Archer (1988) and Archer (1994) found that the learning goal orientation of the classroom perceived by the students is the main factor that affect the students' utilization of effective learning strategies, challenging task seeking and positive attitude towards the class. However, the effects of performance goal orientation are usually insignificant.

In their research (Ames and Archer, 1988), one hundred and seventy-six grade 8 to grade 11 students answered a questionnaire which contained questions assessing the goal orientations adopted by the students, learning strategies used, task challenge selection, attitude towards the class, causal attribution to success and failure and the perceived ability of the students. The learning strategies subscale had 15 items which were extracted from a 90-item Learning and Study Strategy Inventory (Weinstein, Schulte & Palmer, 1987). These items measured students' use of strategies in information processing, self-planning and self-monitoring strategies.

By inspecting the correlations between the variables, Ames and Archer (1988) found that the learning goal orientation was related to the use of effective learning strategies, the attitude toward the class, task challenge and attributing success to effort. The performance goal orientation was inversely related to the altitude toward the class. However, the relationships between the performance goal orientation and the use of effective learning strategies was not significant. Also, students who adopted the performance goal shows insignificant effect on their preferred task that offered challenge.

Consistent results were found under the treatment of hierarchically ordered regression analyses, Ames and Archer (1988) found that both the perceived ability and the learning goal were significant variables to predict the effective learning strategies taken, the task choices and the attitudes toward the class. However, there was no interaction between the perceived ability and the learning goal orientation indicating that the effect of the learning goal orientation did not depend on the perceived ability of the student. In contrast, the performance goal orientation did not predict the learning strategies, the task choice and the attitude toward the class.

In order to compare the sizes of effect between the learning goal and performance goal orientations, Ames and Archer (1988) divided the sample into four groups as followed. According to the their scores on the learning goal orientation (L)

and performance goal orientation (P), high score and low score groups were defined by median split. So, all together there were four groups of students with the combination of high L high P, high L low P, low L high P and low L low P. ANOVA was used to find out the differences on the use of learning strategies, task challenge, attitude toward the class and the causal attribution on success and failure between these four groups. The results indicated that the group difference exited only between the high L and low L group. Whether the P was high or not did not affect the above motivational behavior. That meant the learning goal was the only determining factor of the above motivational variables whereas the performance goal orientation was not. This results were consistent over different statistical analytical techniques such as the correlational analyses and the regression analyses.

The results of Ames and Archer (1988)'s study could also be replicated in Archer (1994)'s study. This time, Archer used 3 independent set of university students as the samples and the work avoidance goal orientation was added as the third goal orientation. The data were analyzed through the correlational inspection, multiple regression and MANOVA. The learning goal orientation had a strong and positive effect on the reported use of metacognitive strategies, positive approach, and choice of hard task, and a strong and negative effect on the choice of easy task. Whereas, the effects of the performance goal orientation on the reported use of learning strategies, choice of hard and choice of easy task were not significant. In that study, it was also found that the correlations between the work avoidance goal and the reported use of metacognitive strategies, positive approach, and choice of hard task were strong and negative. The correlation between the work avoidance goal and the choice of easy task was positive.

Deep and surface level strategies

Nolen (1988), Nolen and Haladyna (1990a, 1990b) found that the achievement goals processed by the subjects affected their use of different learning strategies and

they applied the structural equation modeling (Joreskog & Sorbom, 1986) to study their relationships.

Nolen (1988) reported that the learning goal was strongly correlated with deep processing strategies and less strongly correlated with surface level strategies. Work avoidance goal was negatively correlated to both deep processing and surface processing strategies. In contrast, the performance goal was uncorrelated with both the deep processing strategies and the surface level strategies. The path analysis in her study suggested that the valuing of strategy and the perceived ability of the students did not predict the use of deep processing strategy by students. That was, the direct effect of valuing and perceived ability on the use of deep processing strategies were not significant. In fact, Nolen found that the learning goal being an important variable that dominated the direct and indirect effect on the use of deep processing strategies but the performance goal was not an effective predictor.

Since the effects of performance goal orientation were not significant on most of the learning strategies components, it was ignored in her later study (Nolen & Haladyna, 1990b). The results of this later study confirmed her previous study in that the learning goal had a direct effect on the strategy value belief. Moreover, previous learning goal orientation had indirect effect on the strategy value belief a few months later through the later learning goal orientation.

The strengths of this study (Nolen & Haladyna, 1990b) were that LISREL was applied on the longitudinal data. LISREL has advantage over the path analysis in that the measurement errors are tackled at the same time the model is estimated (Joreskog & Sorbom, 1988). Longitudinal data were collected and the constructs were measured at two waves in this study so that the causal effects of the learning goal on the strategy-value beliefs were supported with stronger empirical data (Marsh, 1990).

However, some weaknesses were found in their statistical analysis procedures. It could be seem that all the constructs were measured by two observable variables. One example was the strategy value beliefs which were measured by the monitoring strategy and the elaboration strategy. These two observable variables were formed by summing the items' scores under the corresponding subscales. One of the problems of this procedure was that it had eliminated the characteristics of different items and some useful information was lost (Marsh & O'Neill, 1984). More seriously misuse of the statistical technique was the combination of two different factors on the same latent variables. Bollen and Lennox (1991) had discussed the differences between the effect and causal indicator measurement models. In the effect indicator model, the indicators should have high correlations within the same construct. They should form a unique factor. On the other hand, the causal indicator model did not require this high correlations. In Nolen and Haladyna (1990b)'s study, effect indicator model was used. However, it was reported in their results of exploratory factor analysis that the elaboration and monitoring strategies were two distinct factors. So, Nolen and Haladyna (1990b) should not use the monitor strategy and elaboration strategy as two indicators for the same latent variables. There were two ways that Nolen and Haladyna (1990b) could solve this problem. Firstly, they might used the causal indicator model instead of the effect indicator model. Secondly, they might divide the strategy value belief variable into two separated latent variables.

Active and superficial cognitive engagements

Meece et al. (1988) examined a mediating model with achievement goals as the mediating factors in science lessons. In their model, perceived competence, intrinsic motivation and attitudes toward science lesson were measured as the antecedents of the achievement goals and then the achievement goals determined the level of cognitive engagement of the students in the classroom. The active cognitive engagement was measured by 10 items and the superficial cognitive engagement was measured by 5 items. The active cognitive engagement measured the students' of metacognitive and

self-regulatory strategies. The self-regulatory strategies included the monitoring of comprehension which had been employed in Nolen's studies (Nolen, 1988; Nolen and Haladyna, 1990a; 1990b). The superficial cognitive engagement measured the strategies used by students in order to complete the school work with minimum effort. 275 fifth-grade and sixth-grade students participated in that study. The data from the survey was analyzed by the LISREL VI program (Joreskog & Sorbom, 1986).

The results indicated that the attitude of the students towards the science subject and their intrinsic motivation acted as the antecedents and influenced their adoption of the learning goal orientation positively and the performance goal orientation negatively. The learning goal orientation influenced the active cognitive engagement positively and strongly (the standardized direct effect is .63). In contrast, the effect of the performance goal on the active cognitive engagement was weak (the standardized direct effect is .17).

Meece et al. (1988) had not put the work avoidance goal and the superficial cognitive engagement in their path model. By the correlational matrix provided in the article, I added these variables into their model in which the work avoidance goal orientation acted as the third mediating factor and the superficial cognitive acted as one of the motivational outcome. The correlational data were analyzed with the LISREL 8 program (Joreskog & Sorbom, 1993) with single indicator path model (Joreskog & Sorbom, 1988). The final modified model is shown in figure 3.1. The results were consistent with the results of the original model with additional information about the work avoidance goal and the superficial cognitive engagement. The intrinsic motivation and the attitude toward science subjects had a negative effect on the work avoidance goal. Then the work avoidance goal influenced the active cognitive engagement weakly and negatively and influenced the superficial cognitive engagement strongly and positively.

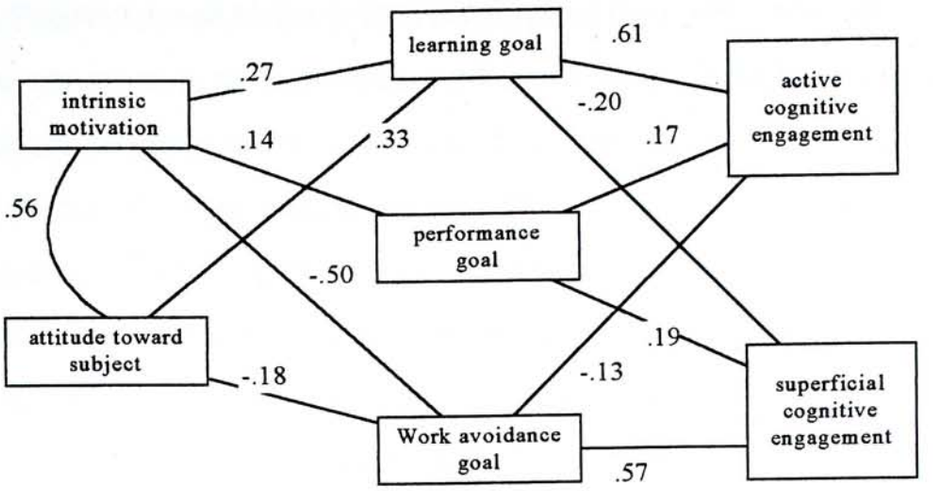

Figure 3.1. Modified model from Meece et al. (1988)'s data.
Numeric values are standardized estimates of the relations among variables.

There were several weaknesses in Meece et al. (1988)'s study. First of all, the factor structure of the active and superficial cognitive engagement subscales were not reported. The authors did not tell whether these two subscales are two unidimensional factors. The items from the subscale of active cognitive engagement were similar to the subscale of deep processing strategy from Nolen (1988; Nolen & Haladyna, 1990b). In Nolen's studies, the deep processing strategy was at least composed of two factors, the elaboration and monitoring strategies, as revealed from the exploratory factor analysis. So, it was questionable for the authors to combine the items into one single factor. Moreover, the authors analyzed the latent variables which had only one indicator. As a result, the use of LISREL as a technique to estimate the measurement errors during the estimation procedure was overruled.

Achievement goals, satisfaction and task choice

If students can enjoy the learning process in the classroom, we believe that they will be more likely to engage more in the learning activities. In long term, the motive for learning becomes intrinsically evolved from the students themselves. On the other hand, if the students feel that the lessons are boring, we believe that they will be more likely to flee from learning.

Nicholls, Patashnick and Nolen (1985) investigated the relationship between the enjoyment in the classrooms, the perceived aims of education held by students and their adoption of achievement goals in schools. That study involved two secondary schools and two grades. The total sample size was 587 students. The scale of purposes of education contained four subscales called wealth/status, commitment to society, understanding the world and achievement motivation. The correlations between the learning goal orientation and the enjoyment in the classrooms were large and positive across the four sets of data. On the other hand, the correlations between the work avoidance goal orientation and the enjoyment in the classrooms were large and negative across the four sets of data. However, the correlations between the performance goal orientation and the enjoyment in the classrooms were nonsignifiant among 3 sets of data.

Similar results were obtained from Duda and Nicholls (1992)'s study on the relations between the achievement goals, satisfaction and boredom in the area of schoolwork and sport. They found that the learning goal orientation were correlated positively with the satisfaction and negatively with the boredom. On the contrary, the work avoidance goal were correlated negatively with the satisfaction and positively with the boredom. However, the performance goal orientation was not significantly related with the satisfaction and positively related with boredom with marginal significance.

Challenging tasks provide the students an opportunity to improve their skill or knowledge to a larger extent as compared with the easier tasks. However, challenging tasks are always more difficult and students usually feel less confident to complete the tasks. It is a threat to the self-worth if they fail to complete the challenging tasks. On the other hand, the self-worth can be more likely to maintain if they choose the easy task.

Recent research has shown that the adoption of the performance goal is a hindrance to the pursuit of challenging task. It is because those students adopting the performance goal may think that the task requires high ability to accomplish and there is a risk that they will fail and low ability is then shown. To elaborate in more detail, Elliott and Dweck (1988) found that individuals with low perceived ability and adoption of performance goal often showed a preference of easy tasks on which success is ensured or extremely difficult tasks on which failure did not indicate their low ability. Even individuals with high perceived ability may sacrifice learning opportunities in the challenging tasks for the opportunities to look smart when compared with others.

With learning goal, students choose challenging tasks regardless of whether their perceived abilities are high or low (Elliott and Dweck, 1988; Nicholls, 1984). They are willing to risk the chance of being displayed as low ability in order to acquire skills or knowledge. These results were confirmed by Ames and Archer (1988). They found that the task choice was more related with the learning goal orientation and less related with the perceived ability. But, contrary to the findings of Elliott and Dweck (1988), it was not related with the performance goal orientation. Archer (1994) differentiated the task choice into choice of hard task and choice of easy task. As predicted, the learning goal orientation correlated positively with the choose of hard task and negatively with the easy task. The pattern of correlations for the work avoidance goal orientation were just the opposite of the learning goal orientation. For the performance goal, the correlations were not significant for either task choices.

Chapter Four Framework of the Study

In this chapter, the definition of the major constructs of the study will be defined. Furthermore, the hypothetical relations and the a priori model of the relationship will be outlined and described.

Incremental theory of intelligence and achievement goals

Learning goal and performance goal are two goal orientations that are well known by many educational psychologists (Ames, 1992; Blumenfeld, 1992; Dweck, 1986; Nicholls, 1984). Students adopting the learning goal aim at developing their skill, learning more knowledge and improving the level of competence in the class (Ames, 1992). Students adopting the performance goal aim at out-performing others in the class (Ames, 1992; Nicholls, Patashnick, & Nolen, 1985). Work avoidance goal is the third goal that has been receiving less attention as the learning goal and performing goal. Students adopting this goal aim at finishing the work with minimum effort as a mean to express their negative attitude towards the school works (Meece et al., 1988). The work avoidance goal is a different construct from the learning goal and performance goal that they form 3 different factors in previous studies (Archer, 1994; Duda & Nicholls, 1992; Meece et al., 1988; Nicholls et al., 1985). As work avoidance goal has not been studies in Hong Kong, one of the aim of this study is to investigate the construct validity of the learning goal, performance goal and work avoidance goal among Chinese students.

The implicit theory of intelligence is the concept of intelligence that had been proposed by Dweck and Leggett (1988) in order to explain the adoption of learning goal and performance goal by the children. It is a bipolar quantity with the entity theory and the incremental theory at the two ends. The incremental theorists believe that their intelligence is malleable whereas the entity theorists believe that their intelligence is fixed and cannot be changed easily. Experiment found that the

incremental theorists tended to adopt the learning goal but the entity theorists tended to adopt the performance goal. In the other words, the incremental theory of intelligence is postulated to be positively related with the learning goal and negatively related with the performance goal.

However, in natural classroom settings, different results were obtained. Roedel and Schraw (1995) found that the incremental theory of intelligence was correlated with the learning goal as predicted by Dweck's theory but it was not related with the performance goal. Using multiple regression, Hayamizu and Weiner (1991) found that the incremental theory of intelligence was both related positively with the learning goal and performance goal. The difference between the experimental results of Dweck and Leggett (1988) and the results of survey of Hayamizu and Weiner (1991) might be due to the different emphasis on measuring the different facets of the performance goal. In Dweck et al.'s study, measurement challenge avoidance was stressed but in Hayamizu and Wiener's study, extent of longing for gaining approval and outperforming others was stressed.

In this study, the items measuring the performance goal were modified from Nicholls (1989) with the emphasis of measurement on the extent of longing for gaining approval and outperformance. So, it was hypothesized in this study that the incremental theory of intelligence would have positive effects on both the learning goal and the performance goal. As the relation between the incremental theory of intelligence and work avoidance goal had not be found in the literature, their relation in this study was exploratory. So a null hypothesis was suggested that there was no significant relation between the incremental theory of intelligence and the work avoidance goal.

Achievement goals and learning strategies

Nolen (1988; Nolen & Haladyna, 1990a; 1990b) developed the concept of deep-processing strategy by decomposition of its construct into three components:

discrimination, elaboration and monitoring. The monitoring strategy is employed by students to ensure the complete understanding of the learned material. Monitoring strategy was also adopted by Ames and Archer (1988) and Archer (1994) and was grouped under construct called the effective learning strategies. In Meece et al. (1988)'s study, it was one of the components of the active cognitive engagement. In Miller, Behrens and Greene (1993)'s study, it was one of the components of the adaptive learning behavior.

The effects of achievement goals on the monitoring strategy were consistent across the literature reviewed. By using path analysis, Nolen (1988) and Nolen and Haladyna (1990b) reported that the learning goal was a strong positive predictor of the monitoring strategy and work avoidance goal was a negative predictor. In Ames and Archer (1988) and Archer (1994)'s study, correlational inspection, multiple regression and multivariate analysis of variances showed that the learning goal was significantly and strongly related with the monitoring strategy. Meece et al. (1988) employed the structural equation modeling and they found that the learning goal could strongly and positively predicted the monitoring strategy. On the other hand, the work avoidance goal could strongly and negatively predicted the monitoring strategy. However, the effects of performance goal on the monitoring strategy were nonsignifiant or weakly related among most of the studies (Ames & Archer, 1988; Archer, 1994; Bouffard, Boisvert, Vezeau, & Larouche, 1995; Lochbaum & Roberts, 1993; Meece et al., 1988; Nolen, 1988; Nolen & Haladyna, 1990b; Schraw, Horn, Thorndike-Christ, & Bruning, 1995).

The strategies in surface-processing approach (Biggs, 1987; Entwhistle & Ramsden, 1983) included reading the whole passage over and over trying to remember all the new words without really understanding its meaning. These denotations of surface-processing strategies were taken up by Nolen (1988) who divided the strategies into three components. These components included reading the whole passage over and over, memorizing all the new words, and repeating the information again and again. In

this study, we used the construct of superficial cognitive engagement which measured the strategies used by students in order to complete the school work with minimum effort (Meece et al., 1988). It should not be confused with the surface processing strategy as the superficial cognitive engagement emphasizes the challenge avoidance nature whereas the surface processing strategy emphasizes the repeating, mindless effort. In Meece et al. (1988)'s study, the superficial cognitive engagement was correlated positively with the learning goal and negatively with the work avoidance goal.

According to the literature reviewed, it was hypothesized in this study that the learning goal was related with the monitoring strategy positively and related with the superficial cognitive engagement negatively. The relation between the performance goal and the monitoring strategy and the relation between the performance goal and the superficial cognitive engagement were hypothesized to be nonsignificant. The work avoidance goal was hypothesized to be related with the monitoring strategy negatively and related with the superficial cognitive engagement positively.

Achievement goals, boredom and choice of easy task

Researchers had found that the feeling of boredom or enjoyment in the lesson was related with the students' achievement goals in their learning processes. Nicholls, Patashnick and Nolen (1985) found that the enjoyment was related positively with the learning goal and negatively with the work avoidance goal in the normal classroom setting. Similarly, Duda and Nicholls (1992) found that the boredom in the normal classroom or in sport training course was negatively related with learning goal and positively related with work avoidance goal. In both studies, the enjoyment and the boredom were not related with the performance goal.

Different students have different tendencies to choose a task. Some may choose an easy but uninteresting task but others may choose a difficult but challenging task. A

preference for difficult and challenging task is essential for the students in the process of learning new knowledge and a good basis for further study. On the other hand, a preference of an uninteresting task may be an indication of aversion toward learning and a potential drop from school. Previous research found that the achievement goals adopted by student determined their choice of easy and hard task. Elliott and Dweck (1988) found that the learning goal affected the students in choosing the hard task and performance goal affected the students in choosing the easy task. These results were confirmed by Ames and Archer (1988) and Archer (1994) except the effects of the performance goal. Both studies found nonsignificant relation between the performance goal and the choice of hard or easy task. Work avoidance goal correlated positively with the choice of easy task and negatively with the choice of hard task (Archer, 1994).

In this study, according to the review of literature, it was hypothesized that the boredom and the choice of easy task were affected by the learning goal negatively and affected by the work avoidance goal positively. But the relations between the boredom and the choice of easy task with the performance goal were hypothesized to be nonsignificant.

Conceptual model

Based on the theoretical framework discussed above, a model was proposed and is summarized in figure 4.1. The incremental theory of intelligence has a positive effect on the learning goal and the performance goal but it has no effect on the work avoidance goal. The learning goal in turns has a positive effect on the monitoring strategy and negative effects on the superficial cognitive engagement, boredom and choice of easy task. The effects of the work avoidance goal on those motivational outcomes are just the opposite of the learning goal. In contrast, the performance goal is hypothesized to have nonsignificant effects on the monitoring strategy, superficial cognitive engagement, boredom and choice of easy task.

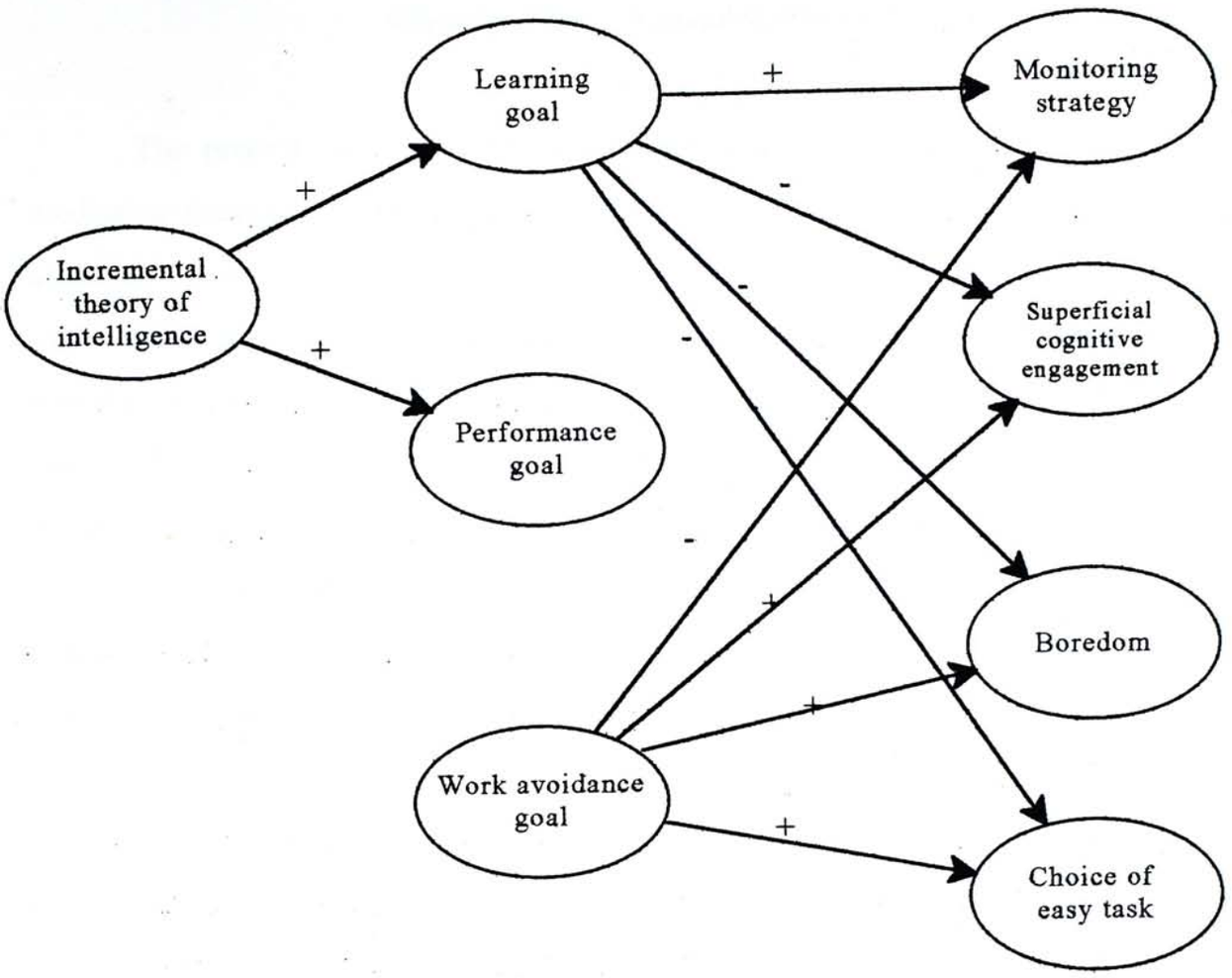

Figure 4.1 Framework of a priori model

Chapter Five Research Method

The present study tried to test a model with achievement goals acting as the mediating factors. Incremental theory of intelligence was proposed to relate with the adoption of the learning goal, performance goal and work avoidance goal of the students. These goals would subsequently relate with students' monitoring strategy, superficial cognitive engagement, boredom and choice of easy task. The data were collected from a one wave cross-sectional survey. The subjects were lower form secondary school students. Since part of the items were self-constructed, item analysis and exploratory factor analysis were used to select the reliable items. Structural equation modeling was then applied to analyze the data with the proposed mediating model. Technique of multiple sample analyses was applied to cross-validate the model using another independent sample of subjects.

Variables

The operational definitions of the variables as measured by the instrument are described below. Here the incremental theory of intelligence refers to students' conception of the malleability of their own intelligence. The learning goal orientation is the purpose of achievement behavior held by students that aims at developing new skills, knowledge and improving level of competence. The performance goal orientation is the purpose of achievement behavior that aims at out-performing others in the class. The work avoidance goal is also one of the purposes of achievement behavior held by students that aims at finishing the work with minimum effort as a mean to express their negative attitude towards the school works. The monitoring strategy is a kind of learning strategy employed by students to ensure the complete understanding during learning process. The superficial cognitive engagement is the degree of participation of the students in the school work, students scoring high in this subscale meaning that they focus their learning to restricted area only and their degree of participation is low. Boredom is a measure of the state of being bored during the

lesson. The choice of easy task is a measure of the tendency that the students will choose the easy task even though the task is not interesting or challenging.

Hypotheses

According to the theoretical framework discussed in chapter four, a model was proposed and the hypotheses are stated below. Hypotheses 1 to 4 concern the relations between the latent variables in the model and it is summarized in model M1.1 (See figure 5.1). In Dweck et al.'s model of achievement goal, the incremental theory of intelligence did not have a direct effect on the motivational outcomes. This proposal is tested under the hypothesis 5. Hypotheses 6 and 7 concern the cross validation of the model with other sample.

1. The incremental theory of intelligence of the students bears a positive relation to the learning goal and the performance goal and has no relation to the work avoidance goal of the students.
2. The learning goal orientation of the students bears a positive relation to the monitoring strategy but negative relations to the superficial cognitive engagement, boredom and choice of easy task of the students.
3. The performance goal orientation of the students does not relate to the monitoring strategy, superficial cognitive engagement, boredom and choice of easy task of the students.
4. The work avoidance goal orientation of the students bears a negative relation to the monitoring strategy but positive relations to the superficial cognitive strategy, boredom and choice of easy task of the students.
5. The incremental theory of intelligence held by the students has no direct effect on the monitoring strategy, superficial cognitive strategy, boredom and choice of easy task of the students.
6. Grade seven and nine students have invariant factor structure in their responses (Model 2.1).

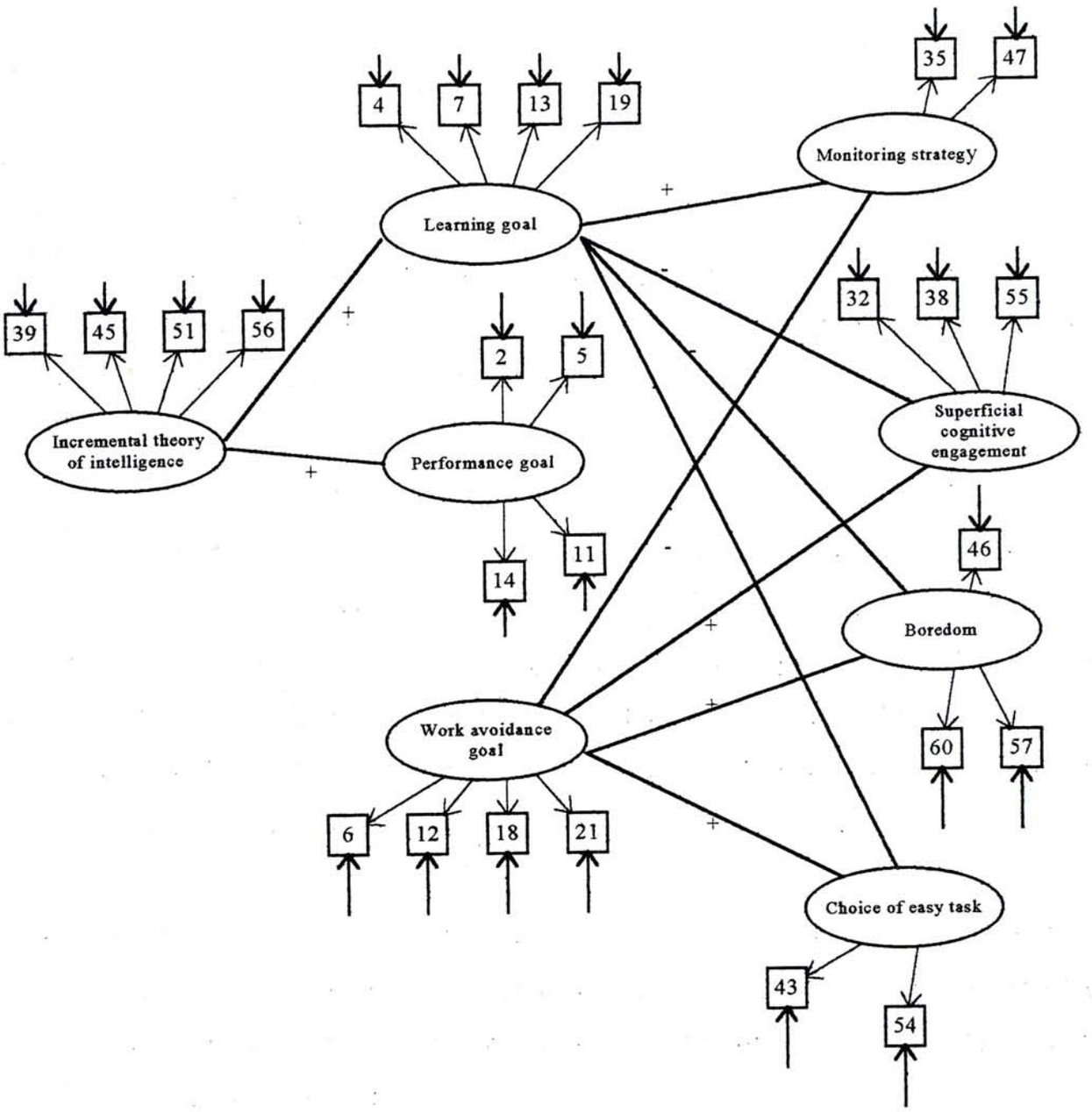

Figure 5.1 Relation among constructs with indicators.
Notes: The paths of correlations between the uniquenesses of the latent variables are not shown.

7. Besides the restraint in Model 2.1, it is further proposed that the parameters of the factors are invariant across the two grade levels (Model 2.2).

Samples

The subjects of this study were Chinese students from subsidized secondary school in Hong Kong. There were 187 Form one (Grade 7) and 192 Form three (Grade 9) students. All students in the intact classes were selected as subjects. The numbers of girls and boys were approximately the same. Their academic achievements were generally above average as compared with that of other schools in Hong Kong. The social-economical status of their families belonged to middle to lower middle. A few missing values had been found for some of the variables for grade 7 sample. Listwise deletion for missing data was used to calculate the covariance matrices for LISREL analyses. The effective sample size became 161 and 192 for grade 7 and grade 9 students respectively.

Procedures

The questionnaire were administrated to the Grade 7 students by their form teachers and were administrated to the Grade 9 students by the researcher of this study. Normal school hours were used for these administrations. Instructions for answering the questions were clearly printed on the front page of the questionnaires. The students were assured that their responses to the questions would be kept confidential and their cooperation were valuable in the educational research. The procedure took about half an hour and all students could finish the questionnaires during this time period.

Instruments

The instruments contained 8 subscales and the ratings were indicated by a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). Each subscale is discussed below. The instruments in English and Chinese can be found in Appendices 1 and 2.

Incremental theory of intelligence. The subscale of incremental theory of intelligence was developed by Marsh (personal communication, January 18, 1994) according to the theory of Dweck et al. (1986, 1988). The scale contains 4 items which were intended to measure the view of the students about the malleability of their intelligence. Examples items were "As I learn new things, I become smarter", "If I work hard I will be smarter."

Learning goal. The subscale was developed by Nicholls et al. (Nicholls, 1989; Nicholls, Patashnick & Nolen, 1985) for high school and junior school students which was originally called task orientation scale. The coefficient alphas reported were .84 to .88) and exploratory factor analyses indicated that the subscale was unidimensional (Nicholls, 1989). In a preliminary pilot study with 202 Chinese students, it was found that the inter-correlations of the original 7 items were high (from .31 to .54). In order to reduce the total number of items to be administered to the students, only 4 items from Nicholls et al.'s scale were adopted. They were selected mainly basing on their high correlations as shown in factor analyses and reliability studies. Sample items were "I feel most successful in school if I learn something new", "I feel most successful in school when the questions make me think hard."

Performance goal. The subscale was developed by Nicholls et al. (Nicholls, 1989; Nicholls, Patashnick & Nolen, 1985) for high school and junior school students which was originally called the ego orientation scale. For similar reasons and using the same strategy as in the learning goal scale, 4 items were selected. Sample items were "I feel most successful in school when I am the best" , "I feel most successful in school

when I do better than other students." The reported coefficient alphas ranged from .62 to .88 in Nicholls' study (1989) and exploratory factor analyses indicated one factor only.

Work avoidance goal. The subscale was developed by the author according to the description of this goal by Meece et al. (1988), Archer (1994) and Nicholls et al. (1985). Four items were selected using the same strategy as in learning and performance goals. Sample items were "I feel happy when I don't need to pay too much effort", "I feel happy when I know that I need not require to pay much time in the study."

Monitoring strategy. The subscale was extracted from Pintrich and De Groot (1990). Similar items had been developed by Entwhistle and Ramsden (1983) and Weinstein, Schulte and Palmer (1987) which were later adopted for use by Ames and Archer (1988) and Nolen (1988). In order to maintain uni-dimensional property, only two items are employed in this study modified by the author. These two items represent a complete understanding of the learning contents. They are "I have to really understand something before I feel that I have learned it" and "When I find something I learned is unclear, I think hard for understanding."

Superficial cognitive engagement. This subscale was originally extracted from the surface learning strategy subscale developed by Biggs (1987). Three items are extracted in order to maintain the uni-dimensional property. They represent a passive learning style of students that concentrate their study on restricted contents only. They are "I only study what the teacher says, no more", "I only try to learn the most important thing" and "I do not waste my time learning things that will not be on the test."

Boredom. This subscale contained four items which was constructed by the author. It intended to measure the feeling of boredom of the students in the class. Examples were "Learning in the lesson is dull", "I always feel tried in the class."

Choice of Easy Task. This subscale contained two items which were constructed by the author. The items intend to measure the tendency of the students in choosing easy task even though the task is not interesting. Examples were "If I can choose between two courses, I will choose a less interesting course because it is more easy", "I will take an easier project even though it may not be challenging and creative."

Statistical analyses

Preliminary analyses

Descriptive statistics such as mean and standard deviation were calculated and inspected. Exploratory factor analysis was conducted for each subscale separately. This was to ensure that each subscale was unidimensional before the reliabilities of the subscales were calculated. Items were deleted if the overall reliability is decreased due to those items. Information such as squared multiple correlation, alpha if item deleted and corrected item-total correlation were useful to identify problematic items. As some of the subscales were translated from English and some of them were newly constructed, it was important to investigate their construct validities. Exploratory factor analysis was employed to see whether there were cross loadings of indicator variables on unexpected latent variables.

Correlations

One commonly used method of finding the correlations between the subscales is to aggregate the scores (with or without weighting) of individual items to obtain a total score for each subscale first. Then the correlations between different subscales are

calculated based on these total scores. The disadvantages of this method are that the individual information of each items may be lost and the measurement errors of each item cannot be estimated. A better method of getting a correlation matrix of the subscales is to use the LISREL VIII program (Joreskog & Sorbom, 1993). The correlations between the variables were found as followed: All the subscales were joined together to form a congeneric measurement model. Each subscale was treated as a latent variable with its corresponding items loading on it as the observable variable (x-indicators). The latent variables were allowed to correlate with each other but the uniquenesses of the observable indicators were assumed to be unrelated (i.e. the Theta-epsilon matrix was diagonal). The diagonal element of the phi matrix were fixed to one before the estimation by LISREL VIII program (Joreskog & Sorbom, 1993). the final Phi matrix obtained after the estimation was used as the zero order correlation matrix between the latent variables for investigation.

Correlations between the constructs were inspected but the results were interpreted with caution. It was because the real relationship between two construct might be reduced or even diminished if the effect of a third construct in the same study was partialled out. A more realistic relation should be found in the structural equation modeling.

Structural equation modeling

After the factors structures of the subscales were confirmed and the irrelevant items were rejected, the proposed models M1.1 (figure 5.1) were tested under the structural equation modeling. The analyses were conducted by a commercially available LISREL VIII statistical package (Joreskog & Sorbom, 1993). All latent variables were inferred by multiple indicators so that the measurement errors of the subscales could be estimated simultaneously during the analyses. The learning goal, performance goal and the work avoidance goal were allowed to be correlated in the psi matrix. Similarly, the monitoring strategy, superficial cognitive engagement, boredom and choice of easy task were also allowed to correlated among themselves in the psi

matrix. All the uniquenesses of the observable indicators were assumed to be uncorrelated that the off-diagonal elements of the theta-delta and theta-epsilon matrices were fixed to zero. Prior to the inspection of the goodness of fit indices, the model should be checked whether the solution was proper. For a proper solution (Hair, 1992), there should not be a negative variances for the parameters; the error variances for any latent variables should be significant; the standardized coefficients should not exceed or close to 1.0 and the standard errors should not be too large. Referring to the measurement model, the loading of the items on factors should be significant.

A priori model was accepted or rejected according to strictly confirmatory method (Joreskog & Sorbom, 1993). By this method, criteria are set at a pre-determined values. When the goodness of fit indices are greater than these values, the model is accepted. Usually, the minimum value of TLI and CFI are set at 0.90 for an acceptable model (Hair et al., 1992; Hoyle, R. H., 1995). The proposed hypotheses were verified by setting up nested models by adding direct paths (M1.2 to M1.4). The Chi-square differences of the models were compared with the critical values at the specific degree of freedom for confidence level set at .95. A more parsimonious model was preferred if the Chi-square difference was not significant. On the other hand, if the Chi-square difference was significant, a more complicated model was preferred (Bollen, 1989; Hair, 1992).

Cross-validation

Cross-validation of the results were done by comparison with other sample. There were a few reasons that this study requires a cross-validation. Firstly, although the model might be verified to be acceptable, the sample is confined to grade 7 students only. Secondly, the relation between the incremental theory of intelligence and the work avoidance goal was established for the first time. Thirdly, the positive relation between the incremental theory of intelligence with the performance goal found here was different from the proposal of Dweck. Fourth, the insignificant relation between

the performance goal and the motivational outcomes had not been stated explicitly in previous research. So cross-validation was required to see whether the model was also held in other grades of students. Grade 9 students was chosen in this study.

Comparisons between the two grades were conducted by multiple sample analyses (Joreskog & Sorbom, 1988, 1993). The invariance of the pattern of the paths across the two grades was assumed and this model (M2.1) was treated as the baseline model. A more restrictive model (M2.2) was then tested and compared with this baseline model. This more restrictive model assumed that the model had the same path structure across grade 7 and grade 9 samples and the corresponding path coefficients were the same in values.

Chapter Six Results

Items analysis and factor structures of instrument

Table 6.1 shows the number of items, mean rating and standard deviations of the subscales. The total scores of the subscales in this preliminary analysis were calculated by summing the item scores.

In order to verify the unidimensionality of the subscales, exploratory factor analysis for each subscale was employed. According to the scree plots and the criteria that the eigenvalue of the extracted factor should be greater one, all the subscales gave one factor. This showed that all the subscales employed in this study were unidimensional. Unidimensional effect indicators for each latent construct are essential in the structural equation modeling (Bollen, & Lennox, 1991). Further analyses were carried out by combining the subscales. According to the scree plot and the criteria that the eigenvalue of the extracted factor should be greater one, the exploratory factor analysis of the achievement goals subscales gave 3 distinct factors corresponding to the learning goal, performance goal and work avoidance goal. The exploratory factor

Table 6.1
The means, standard deviations and reliabilities for the instruments in this study.

Scale	Number of items	Mean rating	Standard deviation	reliability
Incremental theory of intelligence	4	3.46	1.02	.83
Learning goal	4	3.32	0.93	.74
Performance goal	4	3.73	1.00	.74
Work avoidance goal	4	2.97	1.04	.72
Monitoring strategy	2	3.76	0.92	.61
Superficial cognitive engagement	3	2.73	1.11	.54
Boredom	3	2.90	0.96	.57
Choice of easy task	2	2.93	1.11	.59

analysis of the two learning strategies subscales gave two distinct factors corresponding to the monitoring strategy and superficial cognitive strategy. The exploratory factor analysis of the two motivational behavior subscales gave two distinct factors corresponding to the boredom and choice of easy task. But one item from the boredom also loaded on the choice of easy task heavily and so it was excluded from the subscale. These preliminary results indicated that the resultant subscales were distinct after a items was excluded from the boredom subscale. The results of exploratory factor analyses under the Oblimin rotation and the percentages of the variance explained are shown in table 6.2, 6.3 and 6.4.

Table 6.2
Exploratory factor analysis results (Oblimin rotation): Achievement goals

	Factor Loadings		
items	Factor 1	Factor 2	Factor 3
Work avoidance goal			
Q12	.74577		
Q6	.72508		
Q18	.70858		
Q21	.70355		
Learning goal			
Q4		.78807	
Q7		.78411	
Q19		.73323	
Q13		.63947	
Performance goal			
Q5			-.80997
Q14			-.76208
Q2			-.72588
Q11			-.63082
Eigenvalue	3.34	1.98	1.43

Factor Correlations:

Factor 1	1.00000		
Factor 2	.08454	1.00000	
Factor 3	-.26368	-.24477	1.00000

Note: Factor loadings of magnitude less than .20 are omitted.

Table 6.3
Exploratory factor analysis results (Oblimin rotation): Monitoring strategy, Superficial cognitive engagement

	Factor Loadings	
items	Factor 1	Factor 2
Superficial cognitive engagement		
Q38	.75025	
Q55	.70953	
Q32	.69119	
Monitoring strategy		
Q47		.86114
Q35		.80835
Eigenvalue	1.80	1.20
Factor Correlations:		
Factor 1	1.00000	
Factor 2	-.17247	1.00000

Note: Factor loadings of magnitude less than .20 are omitted. Q52 (which was designed to measure boredom) was deleted from the present and further analysis as it loaded on the choice of easy task factor heavily in an inital analysis.

Table 6.4
Exploratory factor analysis results (Oblimin rotation): Boredom, Choice of easy task

	Factor Loadings	
items	Factor 1	Factor 2
Boredom		
Q60	.78623	
Q46	.73572	
Q57	.61301	-.32279
Choice of easy task		
Q43		.90930
Q54	-.23192	.72220
Eigenvalue	2.01	1.12
Factor Correlations:		
Factor 1	1.00000	
Factor 2	-.22005	1.00000

Note: Factor loadings of magnitude less than .20 are omitted.

After the confirmation of the unidimensionality of the subscales, their reliabilities were found. The Cronbach alpha reliability was .83 for incremental theory of intelligence; .74 for the learning goal orientation; .74 for performance goal orientation; .72 for work avoidance goal orientation; .61 for monitoring strategy; .54 for superficial cognitive strategy; .57 for the boredom (one item was deleted); and .59 for easy task choice. By examining the squared multiple correlations, the alphas-if-item-deleted and the corrected-item-total-correlations, it was found that no more item was required to delete from the subscale.

Simple correlations among latent variables

Table 6.5 shows the zero order correlation matrix obtained from the phi matrix of the congeneric measurement model. By preliminary inspection of the sizes of the zero-order correlation coefficients, it could be found that the findings were conformed with the hypotheses. The incremental theory of intelligence was correlated positively and significantly with the learning goal (.62) and the performance goal (.24) but it did not correlated with the work avoidance goal. The positive correlation with the performance goal supported the proposal that the measurements of performance goal in classroom settings were different from the measurements in experimental settings.

Table 6.5
Zero-order correlations for incremental theory of intelligence, achievement goals, monitoring strategy, superficial cognitive engagement, boredom and choice of easy task.

Variables	1	2	3	4	5	6	7	8
1. Learning goal	1.00							
2. Performance goal	.36**	1.00						
3. Work avoidance goal	.16	.45**	1.00					
4. Monitoring strategy	.51**	.21	-.10	1.00				
5. Superficial cognitive engagement	-.16	.17	.58**	-.31*	1.00			
6. Boredom	-.26*	.20	.49**	-.17	.76**	1.00		
7. Choice of easy task	-.40**	-.02	.69**	-.37**	.82**	.50**	1.00	
8. Incremental theory of intelligence	.62**	.24**	.07	.41**	.06	-.07	-.19	1.00

Note: The correlation values are obtained from the phi matrix in the confirmatory factor analysis of the measurement model including all subscales.
*p<.05, **p<0.01.

The learning goal and the performance goal were correlated significantly at a moderately high value (.36). At the same time, the performance goal and the work avoidance goal were also correlated significantly at .45 but the learning goal and work avoidance goal were not correlated. As predicted, the learning goal correlated positively and significantly with the monitoring strategy (.51) and negatively and significantly with the boredom and choice of easy task (-.26 and -.40 respectively); the performance goal did not correlate significantly with the monitoring strategy, superficial cognitive engagement, boredom and choice of easy task; the work avoidance goal correlated positively, significantly and strongly with the superficial cognitive engagement, boredom and choice of easy task (.51, .41 and .59 respectively). The superficial cognitive engagement, boredom and choice of easy task correlated positively, significantly and strongly between themselves.

From this preliminary observation on table 6.5, it was found that some correlations did not confirm with the original hypotheses. One example was the positive correlation (.42) between the incremental theory of intelligence and the monitoring strategy which apparently suggested that the incremental theory of intelligence might be positively associated with the monitoring strategy which opposed Hypothesis 5. Another example was the marginally nonsignifiant correlation (.21) between the performance goal and the monitoring strategy which apparently suggests that the relation between performance goal and the monitoring strategy might not be negligible which opposed Hypothesis 3. These apparent oppositions to the proposed hypotheses were further investigated in depth in the next section with the use of the more sophisticated structural equation modeling technique.

Structural relations

Structural equation modeling were applied for testing the model M1.1 with multiple indicators. The results of the analysis were based on the Maximum Likelihood

(ML) estimates. The results of the estimation showed that there was no negative variance for all estimated values. There was no large standard errors and the error variances for all constructs were significant. With respect to the measurement model, all the loadings of the latent variables to the observed indicators were significant for confidence level greater than .95. The standardized loadings of the latent constructs to the observable indicators are shown in figure 6.1. The entire model indicated an acceptable fitness with the data (χ^2=343.67, df=280, χ^2/df=1.23, TLI=.93, CFI=.94, RMR=0.065).

In order to verify hypothesis 1, a direct path was added in model M1.1 from the incremental theory of intelligence to the work avoidance goal to form the model M1.2. The goodness of fit indices of this model were : χ^2=342.69, df=279, χ^2/df=1.23, TLI=.93, CFI=.94, RMR=0.062. Comparing with the initial model M1.1, the difference of the Chi square $\Delta\chi^2$=0.98 , Δdf=1 . This $\Delta\chi^2$ was not significant (critical χ^2 =3.84 at df=1 for p=.05) and so a more parsimonious model M1.1 was adopted instead of M1.2. That meant the direct relation of the incremental theory of intelligence with the work avoidance goal was nonsignifiant.

The standardized path coefficients revealed that hypotheses 1, 2 and 4 of this study were confirmed by the data (Figure 6.1). As revealed by the standardized parameters and the t-values of the gamma and beta matrices after the estimation of model M1.1, the direct relations of the incremental theory of intelligence with the learning goal (.61) and the performance goal (.21) were both positive and significant with greater relation with the learning goal. Together with the results revealed by M1.2 that the direct relation of the incremental theory of intelligence with the work avoidance goal was nonsignifiant, the hypothesis 1 was proved to be acceptable.

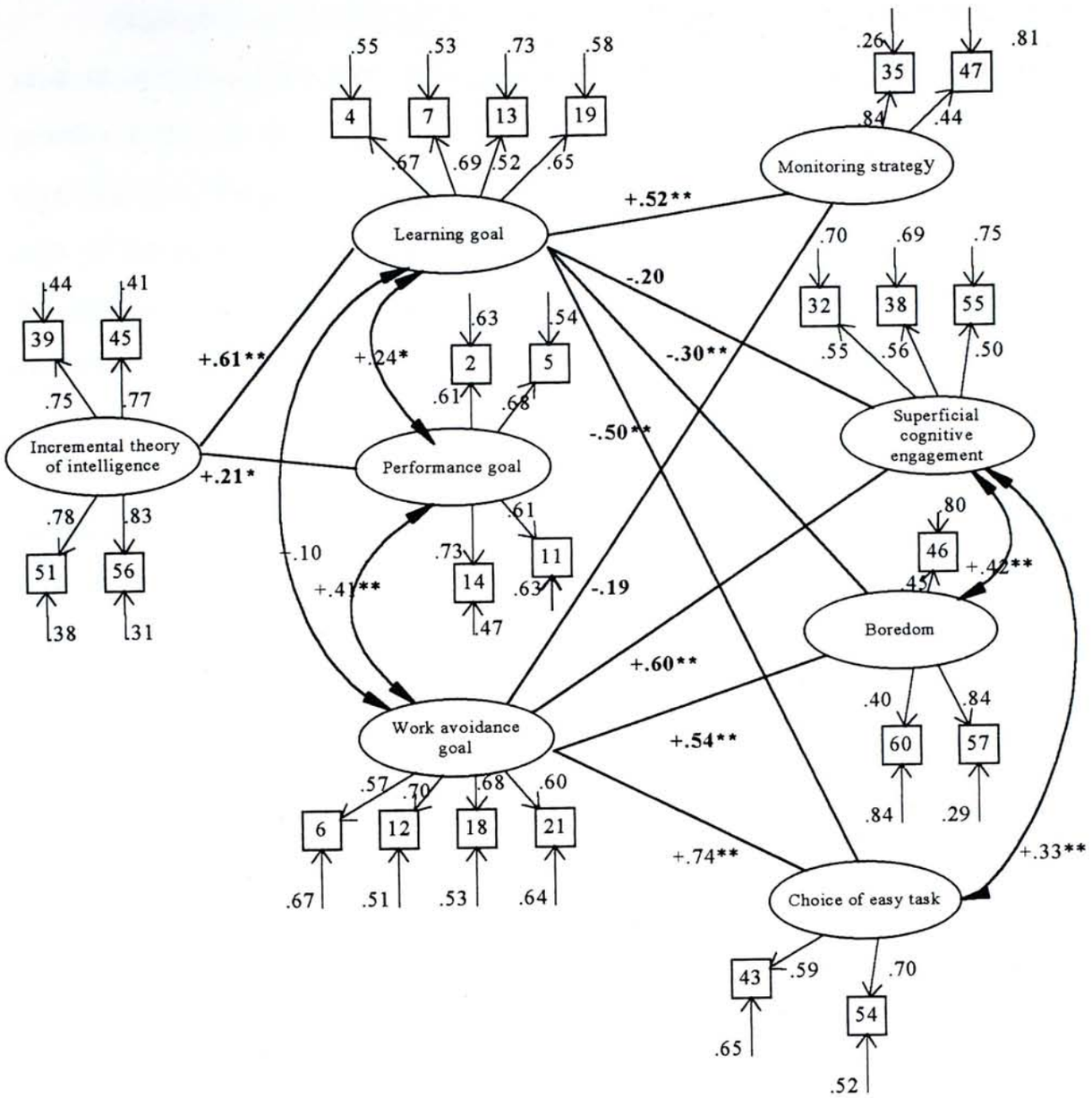

Figure 6.1 Structural relations among constructs. LISREL estimates of model M1.1
Notes: The nonsignificant correlations between the uniquenesses of the latent variables are not shown.
Significant correlations are shown with dotted curved lines.
The path coefficients are standardized.
*p<.05 **p<.01

Estimation of parameters of model M1.1(Figure 6.1) indicated that the direct relation of the learning goal with the monitoring strategy was strong, significant and positive (.52). Its direct relations with the boredom and choice of easy task were significant and negative (-.30 and -.50 respectively). They all confirmed the predicted sign of the hypothesis 2. Although its direct relation with the superficial cognitive engagement was marginally nonsignifiant (t=-1.70), its sign was negative and it also confirmed the predicted sign. Therefore, the hypothesis 2 was accepted to most extent.

As predicted, the work avoidance goal had a negative relation with the monitoring strategy but it was not significant marginally(t= -1.79). Its direct relations with the superficial cognitive engagement (.60), boredom (.54) and choice of easy task (.74) were strong, positive and significant. Therefore, hypothesis 4 is accepted to most extent.

In order to verify hypothesis 3, four direct paths were added in model M1.1 from the performance goal to the 4 motivational outcomes (monitoring strategy, superficial cognitive engagement, boredom and choice of easy task) to form model M1.3. The goodness of fit indices of model M1.3 were : χ^2=338.03, df=276, χ^2/df=1.22, TLI=.93, CFI=.94, RMR=0.064. Comparing with the initial model M1.1, the difference of the Chi square $\Delta\chi^2$=5.64 , Δdf=4. This $\Delta\chi^2$ is not significant (critical χ^2 =9.49 at df=4 for p=.05) and so a more parsimonious model M1.1 was adopted instead of M1.3. The performance goal had nonsignifiant relations with the monitoring strategy, superficial cognitive engagement, boredom and choice of easy task. So, hypothesis 3 was accepted.

In order to investigate whether there were direct relations from the incremental theory of intelligence to the motivational outcomes (monitoring strategy, superficial cognitive engagement, boredom and choice of easy task), an alternative model M1.4 was constructed by adding 4 direct paths from the incremental theory of intelligence to those motivational outcomes. The goodness of fit indices of this model were :

χ^2=337.33, df=276, χ^2/df=1.22, TLI=.93, CFI=.94, RMR=.061. Comparing with the initial model M1.1, the difference of the Chi square $\Delta\chi^2$=6.34 , Δdf=4. The $\Delta\chi^2$ was not significant (critical χ^2 =9.49 at df=4 for p=.05). Since a more parsimonious model was preferred, M1.1 was adopted instead of M1.4. The relations of incremental theory of intelligence with the monitoring strategy, superficial cognitive strategy, boredom and choice of easy task were not significant. Hypothesis 5 was accepted. The goodness of fit indices for model M1.1 to M1.4 are shown at table 6.6

Table 6.6
Goodness of fit indices for model M1.1, M1.2, M1.3 and M1.4.

Model	χ^2	df	χ^2/df	TLI	CFI	$\Delta\chi^2$(df)[a]
M1.1 A priori model	343.67	280	1.23	.93	.94	--
M1.2 M1.1, add 1 direct path from incremental theory of intelligence to the work avoidance goal	342.69	279	1.23	.93	.94	3.84(1)
M1.3 M1.1, add 4 direct paths from performance goal to the motivational behavior	338.03	276	1.22	.93	.94	5.64(4)
M1.4 M1.1, add 4 direct paths from incremental theory of intelligence to the motivational behavior	337.33	276	1.22	.93	.94	6.34(4)

[a]Chi square difference obtained by subtraction from χ^2 of M1.1.

Cross-validation

Model 1.1 had gained the support from data of grade 7 sample. To validate the model across different sample, multiple sample analyses (Joreskog & Sorbom, 1988, 1993) were employed to investigate the difference between grade 7 and grade 9 students. This method involved the simultaneous estimation of model parameters for grade 7 and 9 in the same analysis. Two multiple sample analyses were conducted in order to verify hypotheses 6 and 7. Same number of latent constructs and same number of indicators for each latent constructs were used for the grade 7 and grade 9 data set.

In order to verify the hypotheis 6, the first multiple sample analysis examined the model (M2.1) that assumed the invariant pattern over the two groups, the path coefficients were allowed to be different for the two groups. In statistical terms, the gamma matrix, beta matrix, phi matrix, psi matrix, lambda-X matrix, lambda-Y matrix, theta-delta matrix and the theta-epsilon matrix were assumed to have the same pattern of fixed and freed elements but the values of the freed elements were allowed to be different. The results were treated as a baseline for further comparison. The goodness of fit indices for M2.1 were χ^2=827.28, df=560, χ^2/df=1.48, TLI=.91, CFI=.92. According to the criteria of TLI>.90 and CFI>.90 for an acceptable model, they revealed that the pattern invariance over the two groups were confirmed and hypothesis 6 was accepted.

In order to verify the hypothesis 7, the second multiple sample analysis examined the model (M2.2) that was based on M2.1 with the additional restriction that the gamma and beta matrix elements values were invariant over the two groups and other matrices elements were allowed to be different. That meant, the values of path coefficients from the incremental theory of intelligence to the achievement goals and the path coefficients from the achievement goals to the motivational behavior were assumed to be the same in values among the two groups. The goodness of fit of this model were χ^2=859.97, df=570, χ^2/df=1.51, TLI=.90, CFI=.92. Comparing with M2.1, the difference of the Chi square was $\Delta\chi^2$=32.69, Δdf=10 . This $\Delta\chi^2$ is significant (critical χ^2 =18.31 at df=10, p=.05,). Although M2.2 was more parsimonious, its

increase in χ^2 was significant that Model M2.1 was preferred instead of model M2.2. As a result, hypothesis 7 was rejected. The goodness of fit indices of models M2.1 and M2.2 are shown in Table 6.7.

Since hypothesis 6 was accepted and hypothesis 7 was rejected, the paths structure of M1.1 for grade 7 students could also be applied in grade 9 students, but the path parameters for grade 7 students might be different from that of grade 9 students. So it was important to check whether the hypotheses that was accepted in one sample but rejected by the other. The main concern here was not to compare the sizes of the loadings, but to check whether the signs of the path coefficients were different in these two samples. Table 6.8 lists the sign and strength of the path coefficients of the model M2.1 in common metric completely standardized form for the grade 7 and grade 9 students.

From table 6.8, it can be observed that all the path coefficients in grade 7 have the same signs as their corresponding coefficients in grade 9 and these signs are the same as predicted by the hypotheses. Both grade 7 and grade 9 showed that the incremental theory of intelligence had a positive and significant relation with the performance goal (.16 and .57 respectively) and a stronger positive and significant relation with the learning goal (.43 and .62). The learning goal had a positive and significant relation on monitoring strategy (.54 and .69) and negative and significant relations with the superficial cognitive engagement (-.26 and -.37), boredom (-.35 and -.44) and choice of easy task (-.52 and -.34). The work avoidance goal had positive and significant relations on the superficial cognitive engagement (.84 and .33), boredom (.69 and .14) and choice of easy task (.84 and .38). There were two minor differences between grade 7 and grade 9 students found in table 6.8. The relation of the learning goal with the superficial cognitive engagement became significant for grade 9 sample but not for grade 7 sample (-.26, -.37). Also, the relation of the work avoidance goal with the boredom becomes nonsignifiant for grade 9 sample but significant for grade 7 sample (.69 and .14). These results indicated that the hypothesis that were verified through the grade 7 sample were also supported by grade 9 sample with minor alternations.

Table 6.7
Goodness of fit indices of Model M2.1 and M2.2.

Model	χ^2	df	χ^2/df	TLI	CFI	$\Delta\chi^2$(df)[a]
M2.1 invariance pattern between grade 7 and grade 9	827.28	560	1.48	.91	.92	--
M2.2 M2.1, gamma and beta elements are fixed to be invariant	859.97	570	1.51	.90	.92	32.69(10)

[a]Chi square difference obtained by subtraction from χ^2 of M2.1.

It was interesting to note that some coefficients have large differences between grade 7 and grade 9 samples. For example, the relation of incremental theory of intelligence with performance goal was much larger in the grade 9 sample (.57) than the grade 7 sample (.16). Moreover, the correlation between the learning goal and the performance goal after the effect of incremental theory of intelligence had been partialled out much larger in the grade 9 sample (.43) than the grade 7 sample (.11). When comparing the strengths of the relations of the work avoidance goal with the motivational behavior, the relations in grade 9 sample were generally weaker (-.02, .33, .14, .38) than the grade 7 sample (-.22, .84, .69, .84). The strengths of relations of the learning goal with the motivational behavior were also different for the two samples. These relations in grade 9 sample are generally stronger (.69, -.37, -.44, -.34) than the grade 7 sample (.54, -.26, -.35, -.52) except the loading on the choice of the easy task.

Table 6.8
Important parameter estimates (standardized coefficients) for model M1.1 and M2.1

Model	INC LG	INC PG	LG MS	LG SCE	LG BO	LG ETC	WA MS	WA SCE	WA BO	WA ETC
M1.1 (grade 7)	.61**	.21*	.52**	-.20	-.30**	-.50**	-.19	.60**	.54**	.74**
M2.1 (grade 7)	.43**	.16*	.54**	-.26	-.35**	-.52**	-.22	.84**	.69**	.84**
M2.1 (grade 9)	.62**	.57**	.69**	-.37**	-.44**	-.34**	-.02	.33**	.14	.38**

Note: M1.1 employs data set from grade 7 sample only. M2.1 is multiple sample analysis that compares grade 7 and grade 9 samples.
*p<.05, **p<.01.
INC=Incremental theory of intelligence, LG=Learning goal, PG=performance goal, WA=Work avoidance goal, MS=Monitoring strategy, SCE=Superficial cognitive engagement, BO=Boredom, ETC=Choice of easy task.

Chapter Seven Discussion

The results of this study supported the hypotheses 1, 2, 3, 4, 5 and 6 that the incremental theory of intelligence was related to students' adoption of the learning and performance goals. Subsequently, the adoptions of the learning goal by the students led to the use of the monitoring strategy and to the rejection of the superficial cognitive engagement. Those students usually enjoyed their classroom life and chose challenging task. The adoption of the performance goal did not have any relation to students' learning strategy and motivational behavior. For student who adopted the work avoidance goal, they seldom used the monitoring strategy for better understanding of their school work and their engagements in the classroom work were kept to the minimum. Those students usually felt dull in the lesson and they would choose easy task if possible to minimize their effort. The findings suggested that the impacts of the belief of the malleability of intelligence on learning strategies and on motivational behavior were indirect and mediate through the adoption of the learning and performance goals.

The validity of the work avoidance goal

The construct validity and the criteria-related validity of the work avoidance goal had been examined in this study. It had been found that in the exploratory factor analysis, 3 factors were found. They were learning goal, performance goal and the work avoidance goal. Moreover, the structural equation model with the work avoidance goal as one of the mediators depicts that the work avoidance goal predicted in a large degree the use of the monitoring strategy, the degree of cognitive engagement, the feeling of boredom and the choice of the task of the students in the classroom. As the students selected here were academically high-achievers, the work avoidance goal was seemed to be inapplicable for them. Nonetheless, the work avoidance goal had been shown to predict a large degree of the motivational behavior. This study has demonstrated that, whenever possible, the work avoidance goal should be included in

future achievement goals studies for better understanding of the motivational behavior of the students whatever the level of academic achievement they belong.

At first glance, it is surprising to note that the work avoidance goal did not relate to the use of monitoring strategy. This means that students with stronger work avoidance goal who preferred to do little work did not reduce their attempt to understand the learning materials. This relation could be explained by knowing that the student of this study were restricted to high achievers only. The high achievers did also feel tired or frustrated when they faced difficult work as the low achievers did, but the high achievers and low achievers differed in their persistence in understanding the learning materials. For high achievers, there were other proponents (e.g. the request of their parents or their goal setting) that drove them to continue the work (Miller, et al., 1993). This difference between these two kinds of students could be a reason that led to their difference of the use of monitoring strategy at schools. If a more diversified sample had been used, it might appear that the work avoidance goal would be related negatively with the monitoring strategy.

Relations between incremental theory of intelligence and achievement goals

As predicted, when students have a strong belief that their intelligence is malleable and can be enhanced through their effort, they have a greater tendency to merit the learning process and take the aim of mastering new skills and understanding new knowledge. In other words, they adopt the learning goal as their aim during learning. This finding is consistent with previous research (Dweck, 1986; Hayamizu & Weiner, 1991; Roedel & Schraw, 1995).

It is noteworthy that the incremental theory of intelligence also has a significant and positive relation to the performance goal adopted by the students. Students who take the belief that their intelligence is malleable have a greater tendency to evaluate their ability and to obtain a favourable evaluation by doing better than their classmates.

This finding is contrary to the proposal of the Dweck and Leggett (1988) that suggested the incremental theory of intelligence should have a negative relation with the performance goal. This difference may be accounted for by the different designs of the studies. In Dweck's studies, experimental designs were used for most of the time and the performance goal was experimentally induced on the children in which challenge avoidance was stressed. But in naturalistic design (Hayamizu & Weiner, 1991; Roedel & Schraw, 1995), in which questionnaires were administrated during normal class period, the performance goal subscale was developed from Nicholls (1989) with the emphasis of measurement on the extent of longing for gaining approval and outperformance. In these cases, the incremental theory of intelligence had a positive relation with the performance goal. Hence, it is reasonable for the relation of the incremental theory of intelligence with the performance goal found in this naturalistic study follows the findings of other naturalistic studies.

This study supports the notion that achievement goals are mediators that connect the individual differences and the motivational outcomes (Meece, et al., 1988). Most of the relations of the incremental theory of intelligence with the monitoring strategy, superficial cognitive engagement, boredom and choice of easy task are indirect and through the learning goal and performance goal.

Relation between achievement goals and motivational behavior

Consistent with previous research, this study indicates that when students aim at acquisition of knowledge or mastery of skills, they tend to use more sophisticated learning strategy. They will try to monitor their learning pace in order to understand the materials. As complete understanding is the base for memorization and applications of the knowledge, students taking the learning goal orientation will receive the benefit in long run.

Large percents of variance of the superficial cognitive engagement variable and the choice of easy task variable can be explained by the adoption of the work avoidance goal by the students. These show that the work avoidance goal has a great impact on the students' academic school life. Students who are classified as belonging to superficial cognitive engagement is inclined to study in a restricted area which is probably dictated by the teachers. Their learning style is passive and they will probably lose the interest of learning after their school life.

The feeling of boredom can be partly explained by the adoption of the work avoidance goal by the students. Usually, the boredom feeling of the students during the lesson is believed to be induced by the ineffective and boring instructional method employed by the teachers. This study shows that individual factors such as the adoption of the work avoidance goal are also influential on the feeling of boredom. With the same class environment, students adopting the learning goal do not feel that their classes are dull whereas students adopting the work avoidance goal feel that their classes are dull.

It is interesting to find that the performance goal did not relate to the monitoring strategy, superficial cognitive engagement, boredom and the choice of easy task. There may be two explanations for this findings. Firstly, this relation may be mediated by the perceived ability of the students (Ames, 1992). Elliott and Dweck (1988) found that when performance goal is highlighted, students with high perceived ability will choose moderate or moderately difficult task to display their competence and their effective problem solving strategies remained in response to difficulty. On the other hand, students with low perceived ability will choose easy task to avoid the display of their incompetence and their effective problem solving skills are deteriorated. So when students of different perceived abilities were pooled together into the analysis in this study, the positive and negative relations between the performance goal and these motivational outcomes might be canceled out that the performance goal showed nonsignificant relation with them. Perceived ability is only one of the potential

constructs that differentiate the students, future research may be done to verify the effect of the perceived ability and to find out other potential influential constructs.

The second possible explanation is related to the cluster analysis done by Meece and Holt (1993). They had identified three clusters of students by the criteria of locating their scores of learning goal, performance goal and work avoidance goal. One cluster of students had high learning goal together with high performance goal which meant high performance goal students usually score high learning goal. If this was also true in this study, the relations between the performance goal and the motivational outcomes might be overwhelmed by the relations between the learning goal and the motivational outcomes.

Differences between grade 7 and grade 9 samples

The results of the cross-validation showed that the model was also held for the other sample. The incremental theory of intelligence was positively and strongly related to the adoption of learning goal and positively related to the performance goal. The learning goal was positively related to the monitoring strategy but negatively related to the superficial cognitive engagement, boredom and choice of hard task. On the other hand, the work avoidance goal was negatively related to the monitoring strategy but positively related to the superficial cognitive engagement, boredom and choice of hard task. As predicted, the performance has insignificant relation with the motivational outcomes.

Although the structure of the models were the same for grade 7 and grade 9 samples, the strength of the relations were different for some path. For example, the relation between the incremental theory of intelligence and the performance goal was much stronger in the grade 9 sample than the grade 7 sample. This may due to the fact that the grade 9 students were facing a decision of entering Science stream or Arts stream in next academic year (grade 10). As Science stream was favourable by the

students in that school but the places for Science stream were limited, competition between grade 9 students was violent. A student who believed that his intelligence was malleable not only care about the learning process itself, he should also plan for his future study. In order to get a place in the Science stream, he had to compete with others. As a result, his score on performance goal would be larger. This explanation is supported by the fact that the correlation between the learning goal and the performance was much larger in the grade 9 sample than the grade 7 sample.

This competitive environment among the grade 9 students might also have its influence on the relations between the work avoidance goal and the motivational outcomes. Table 6.12 shows that the loadings from the work avoidance goal to the motivational outcomes in grade 9 sample are generally weaker than the grade 7 sample. Grade 7 students had just enter the secondary school from the primary school. Their promotions to grade 8 in next academic year were nearly warranted. As compared with their grade 6 studies in the primary schools, the pressure of learning from their parents and their schools were much released. As a result, for two students coming from grade 7 and grade 9 who had the same degree of tendency to adopt the work avoidance goal, the grade 9 student was less likely to choose an easy task and dismissed the monitoring strategy because he cared much more than the grade 7 student about his examination results.

It is interesting to note that the competitive environment among the grade 9 sample might have a similar influence on the learning goal. As depicted from table 6.12, the loadings from the learning goal to the motivational outcomes in grade 9 sample were generally stronger than the grade 7 sample except the loading on the choice of the easy task. Generally speaking, the competitive environment may intensify the relations between the learning goal and the motivational outcomes but lessen the relations between the work avoidance goal and the motivational outcomes. Nevertheless, the suggestion above is derived from one set of data only, further

research should be done to verify the effect of competitive environment on the learning goal, performance goal and work avoidance goal.

Implication of the findings

This study provides a framework for the teachers to promote the effective learning strategies and to advocate the choice of more challenging task. Researchers knew that the adoption of learning goal by the students can lead to the use of effective learning strategies and increase the chance of choosing more challenging but difficult tasks. Some of the researchers have emphasized the classroom environment and some of them have emphasized the individual factor to promote the adoption of learning goal. One of the significance of this study is to support the theory that the implicit theory of intelligence as an individual factor is one of the determinants of the learning goal orientation. By manipulating the incremental theory of intelligence held by students, it is believed that the use of effective learning strategies and the choice of challenging task will be followed eventually. Reading passages which stress the malleability of intelligence may be one of the many methods that can change the concept of intelligence of the students.

Work avoidance goal is not commonly employed in previous researches as compared with the learning goal and the performance goal. This study has shown the construct and criteria-related validity of the work avoidance goal. It is not just the opposite of the learning goal. In fact, it is found that it is not correlated with the learning goal but its relation with the learning strategies and the motivational outcomes are just the opposite of that of the learning goal. The addition of the work avoidance goal into the model help to explain the adoption of different learning strategies and motivational outcomes. In first glance, it is thought that this goal is highly associated with the low achievers. The study shows that even high achievers process this goal and many motivational oucomes are related to it.

Another significance of the study is the employment of the structural equation modeling with multiple indicators. The measurement errors of the latent variables are estimated simultaneously. Cross validation of the results is done between different grades by using multiple sample analysis. As compared with the similar research of achievement goals that employed the correlations inspection or multiple regression without cross validation, this study provides more trustful results.

Limitations of the study

The data in this study were collected as a cross-sectional design only. Thus, the causal relation between the antecedents, achievement goals and motivational outcomes cannot be confirmed. A causal relation is one that the change of one construct leads to the change of another construct afterwards (Heise, 1975). Bagozzi (1980) states that a causal relationship is established under 3 criteria. First, the correlation between the two constructs should not be weak. Second, one construct should be demonstrated as the antecedent of the other construct. Third, there is no other dominate causes. If a causal relation is pursued, a multi-wave design in which the indicator variables are measured in different times (Marsh, 1990) or an experimental design can give stronger support (Marsh et al., 1994). In testing the causal relation with the structural equation model in a single wave design, theories based on literature review should be referenced (Hair et al., 1992). In this study, the proposed model is derived from Dweck's achievement goals theory and the causal ordering of implicit theory of intelligence, achievement goals and motivational outcomes are confirmed by experimental settings. Although this study alone cannot provide a firm evidence for the causal relationship, the theoretical framework that it is based can provide strong support.

The subjects of this study is limited to one secondary school and only grade 7 and grade 9 students were involved. As the sampling method was not random, the specific environment of the school, the administration of the school and the ideology of the principal and teachers might affect the learning behavior of the students. As a

result, the findings of this study may not be directly generalized to the populations and they should be interpreted cautiously.

The antecedents of the achievement goals included in this study were confined to implicit theory of intelligence only. Other individual factors had been shown to be influential on the achievement goals such as the intrinsic motivation (Harter, 1981; Harackiewicz & Elliot, 1993; Harackiewicz & Manderlink, 1984), the perceived ability of the students (Harter, 1982; Archer, 1994; Miller et al., 1993) and the perceived aims of schooling (Nicholls et al., 1985). Moreover, no situational factor such as the classroom climate is employed. In fact, classroom climate was believed to be a strong factor that influence the adoption of the achievement goals by the students (Ames, 1992). Because of the limited resources of this study, they were not considered here. Future research should incorporate these construct into their studies.

All the instruments employed in this study were translated from English. No further procedure was applied to verify the congruence between the English version and the Chinese version. Some of the scales were first constructed and their validity and reliability had not been tested seriously. Nevertheless, the results of this study provide preliminary information on the construct validity, predictive validity and reliability of the subscales. Another potential limitation of the measuring instruments was about its format. Since self-report questions were asked, the responses of the students might not correctly reflect their opinion and the real situation. Sometimes, students may answer the question in order to please the teacher or they might afraid that their personal responses would be disposed openly. In order to adjust this potential discrepancy, other research method such as think-aloud protocols or structured interviews should be employed to supplement the findings of the self-report surveys.

In this study, the basic relations among students' theories of intelligence, achievement goals and motivational behavior were delineated. In sum, most of the findings in the present study supported previous research in other Western societies.

Cross-cultural consistent patterns rather than differences were observed despite the fact that Chinese students were comparatively more effort and learning oriented. Limitation of the present study as well as implication for further research have also been discussed.

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Appendix 1
The English Version of the Questionnaire Items

Learning goal

Q4 I feel most successful in school when I learn something new.
Q7 I feel most successful in school when I learn something interesting.
Q13 I feel most successful in school when what I learn really makes sense.
Q19 I feel most successful in school when the questions make me think hard.

Performance goal

Q2 I feel most successful in school when I am the best.
Q5 I feel most successful in school when I do better than other students.
Q11 I feel most successful in school when I do something others cannot do.
Q14 I feel most successful in school when I am the only one who can answer a question.

Work avoidance goal

Q6 I feel happy when I don't need to pay too much effort.
Q12 I feel happy when I know that there is only a few assignments.
Q18 I feel happy when I know that I need not require to pay much time in the study.
Q21 I feel happy when I know that my teacher gives me a little coursework.

Monitoring strategy

Q35 I have to really understand something before I feel that I have learned it.
Q47 When I find something I learned is unclear, I think hard for understanding.

Superficial cognitive engagement

Q32 I only try to learn the most important thing.
Q35 I only study what the teacher says, no more.
Q55 I do not waste my time learning things that will not be on the test.

Choice of Easy Task

Q43 If I can choose between two courses, I will choose a less interesting course because it is more easy.
Q54 I will take an easier project even though it may not be challenging and creative.

Boredom

Q46 I always feel tried in the class.
Q52 I prefer holiday instead of school day.
Q57 I am hoping for the bell's ringing during a lesson.
Q60 Learning in the lesson is dull.

Incremental theory of intelligence

Q39 As I learn new things, I become smarter.
Q45 If I work hard, I will be smarter.
Q51 If I pay effort in the course, I will be smarter.
Q56 As I read more books, I become smarter.

Appendix 2
The Chinese version of the questionnaire items

Learning Goal

Q4 在學校當我學到新事物時，我感到最成功。
Q7 在學校當我學到一些有趣的事情時，我感到最成功。
Q13 在學校當我將所學的變得合理有意義時，我感到最成功。
Q19 在學校當問題令我思考時，我感到最成功。

Performance Goal

Q2 在學校當我的成績最好時，我感到最成功。
Q5 在學校當我比其他同學做得更好時，我感到最成功。
Q11 在學校當我做些他人無法做到的工作時，我感到最成功。
Q14 在學校當我是唯一懂得回答某難題時，我感到最成功。

Work Avoidance Goal

Q6 我感到高興當我不用付出很大的努力。
Q12 我感到高興當我知道某一科的功課很少。
Q18 我感到高興當我不用付出很多時間。
Q21 我感到高興當我發現教我的老師給我們很小作業。

Monitoring strategy

Q35 我將老師所教的想得清楚明白才會滿意。
Q47 在學習上遇到不明白之處，我希望把它想通。

Superficial cognitive engagement

Q32 我只溫習課程的重點部份，不理會其他枝節。
Q38 我只溫習老師所指定的內容。
Q55 我並不會花時間在測驗範圍以外的知識。

Choice of easy task

Q43 如果有兩個學科給我選讀，一難一易，我通常會選擇易的那科讀。
Q54 如果給我自由,我會選擇一個較易的習作來做,儘管它沒有新意。

Boredom

Q46 在課堂裏，我常常沒精打彩。
Q52 在上課與放假之間選擇，我寧願放假。
Q57 我常盼望快點響下課鍾。
Q60 課堂的生活很沉悶。

Incremental theory of intelligence

Q39 當我的見識增長了，我便聰明些。
Q45 當我努力，我便聰明些。
Q51 當我在課業上努力，我便聰明些。
Q56 當我看更多書，我便聰明些。